11 Defensive protection of farmers’ varieties

Isabel López Noriega

Introduction

In 2006, I was invited to participate in a seminar arranged by the Institute of Agricultural Research in Peru (INIA, Instituto Nacional de Innovación Agraria) on the creation of a national official register for landraces and traditional varieties of potato and maize. This register was to be an officially recognized list that would be supported by the government, where different users could enter and access information about Peruvian traditional varieties of potato and maize. The main purpose of the seminar was to discuss possible objectives of the register with a number of people involved in genetic resources conservation and use within the country, including research institutes, farmers’ associations and organizations working with indigenous communities. During the seminar, several participants argued that one of the most important objectives of the register should be to officially recognize traditional farmers as the originators of the huge biodiversity of potatoes and maize that are conserved and cultivated in Peru.

Being educated in Europe and having a legal background, I quickly and naturally assumed that they were somehow talking about granting farmers intellectual property rights over their varieties. I raised my hand and asked if they were actually meaning to confer this idea and, if so, how they were planning to do it. The reaction from the audience was strong and immediate. Participants who were representing the farmers as well as the national research institute stated that neither the farmers nor the public institutions in Peru wanted to be given any monopoly rights over their traditional varieties and landraces but that they simply wanted to be recognized as the developers and conservers. As they explained to me, these varieties have to be freely available for anyone to use, just as they always have been, and no one should claim any intellectual property rights over them or benefit from the use of their genetic resources without recognizing the provenance of the varieties and the efforts of traditional farmers. By documenting the existence of these varieties and their provenance, they said, the register will show that they are not new, thereby preventing enterprises in the developed world from getting patents or plant variety rights over them. In addition, thanks to the information stored in the register for each variety, these enterprises will know with whom they have to share the benefits if they make money off the use of the registered varieties.
Peruvians’ fear that their plant genetic heritage could be misappropriated is well founded. The expansion of the scope of intellectual property rights and their protection’s standardization through multilateral and bilateral international agreements have made it possible to apply for intellectual property on ideas and inventions; 20 years ago scholars would have agreed these were not eligible for intellectual property protection in countries with a long tradition of little to no recognition or enforcement of intellectual property rights. The number of patent and plant breeders’ rights (PBR) applications to get control of the exploitation of plants, plant varieties and their seeds has dramatically increased in the last decade, in particular in developed countries and emerging economies.

In the middle of this intellectual property fever, some intellectual property offices have granted patents or PBRs over varieties and plants that were not new or over products and processes that are actually similar, if not identical, to indigenous or local communities’ traditional uses of plants. These cases of misappropriation have increased stakeholders’ awareness, in both developing and developed countries, about the importance of protecting the public nature of plant and plant uses traditionally available to anyone, such as landraces and most farmers’ varieties. As my Peruvian colleagues argued, one way of ensuring their protection is by documenting the existence of these varieties in public databases so that their lack of novelty makes them ineligible for patents and plant variety protection (PVP). But how should this documentation be completed in order to ensure the effective defensive protection of farmers’ varieties? Is an online register enough? What information should be published and how? What are the criteria that effectively define farmers’ varieties in defensive protection strategies? What form of publication has the best chance to be taken into consideration by patent and PVP offices? And have these offices enough capacity to access and use this information anyway?

Since the INIA-Peru workshop in 2006, I have followed very closely the creation of the Peruvian national register of landraces and farmers’ varieties of potato and maize. I have tried to assess the actual capacity of the Peruvian register and other similar initiatives to protect traditional and farmers’ varieties against misappropriation and analyze possible measures to make the defensive protection of farmers’ varieties more effective. This chapter is the result of this analysis.

**Threats to plant varieties in the public domain**

In many countries, the term public domain is widely used to describe public goods such as land or water. However, the usage of this term in the intellectual property world comes from the French term *domaine public*, which was adopted in the language of the Berne Convention for the Protection of Literary and Artistic Work. In this context, the term public domain is used to describe those creative works whose use is not restricted by copyright – that is, all of the original works of art, literature, music and so on whose copyright has expired,
that cannot be subject to copyright law or that was created before the existence of copyright. Public domain is also utilized in the context of patents, although patent legal texts do not actually refer to the public domain per se. In the case of patents, the public domain embraces all of the inventions for which the term of patent has expired, those that have been disclosed without patenting them and those that are not eligible for patentability according to the law. Since proprietary rights are founded in national laws, the extension and the boundaries of the public domain differ among countries. An invention can be patented in one country and at the same time be in the public domain of another country. Similarly, in the context of PVP or PBR, the public domain is constituted negatively, without explicit mention in international agreements or national laws, by varieties (and populations) that have not been protected through breeders’ rights or whose protection has expired.

The public domain has traditionally been defined in a negative manner, as whatever is not subject, and cannot be subject, to intellectual property rights. However, in recent years, a number of scholars have started to pay attention to the affirmative elements of the public domain with the idea of recognizing its own entity and conferring its own protection. This recent attention to the public domain responds to the increased concern about the extension of property rights over creations, ideas and facts that were not eligible for intellectual property protection a few years ago.

In the field of plant genetic resources, the public domain’s usual territories are being threatened not only by recent trends to extend patentability to elements that were not considered patentable before but also by the serious failures of the current intellectual property system. Let us briefly analyze these two factors.

Trends to extend patentability on life forms

Several decisions in the patent offices of the United States and Europe have paved the road towards the patentability of life forms, including plant varieties. Since these countries deal with the majority of patents and PVP in the world, it is worth analyzing with some detail their current patent legislation and its interpretation in the field of life forms. In 1979, the US Court of Customs and Patent Appeals clarified that living organisms modified by human intervention fall under the definition of ‘manufacture’ or ‘composition of matter’ according to section 101 in Title 35 of the US Code on Utility Patents. One year later, in the famous case of Diamond v. Chakrabarty, the same court ruled that claims were not outside the scope of patentable inventions merely because they dealt with live organisms and stated that a live, human-made microorganism is patentable subject matter. Any remaining issues about the possibility of patenting plants and seeds in the United States were clarified in the case Ex parte Hibberd, where the Board for Patent Appeals and Interferences admitted a patent application on maize plant tissues and seeds and stated that patents could be granted on plant inventions despite the fact that they could also be protected by
the *sui generis* system under the International Convention for the Protection of New Varieties of Plants (UPOV Convention), which was implemented in the United States through the Plant Variety Protection Act.6

In 1990, the Examining Division of the European Patent Office (EPO) initially refused a patent application on a transgenic mouse, among other things, on the grounds that the 1973 Convention on the Grant of European Patents (European Patent Convention) excluded patentability of animals per se.7 This decision was appealed, and the Board of Appeal held that animal varieties were excluded, in particular, by Article 53 of the European Patent Convention, while animals as such were not excluded from patentability.8 The Examining Division then granted the patent in 1992. The Board of Appeal confirmed this position some years later, clarifying that claims which do not refer to particular varieties of plants are not excluded from patentability according to Article 53 of the European Patent Convention, even when they may include plant varieties.9 This has been the approach adopted by EC Directive 98/44 on the Legal Protection of Biotechnological Inventions, which states that ‘inventions which concern plants or animals shall be patentable if the technical feasibility of the invention is not confined to a particular plant or animal variety’ (Article 4.2). The current guidelines for examination in the EPO state that ‘a process claim for the production of a plant variety (or plant varieties) is not *a priori* excluded from patentability merely because the resulting product constitutes or may constitute a plant variety’ (European Patent Office, 2013). Bearing in mind that a patent’s protection can apply not only to the process but also to the resulting plant, its parts and its seeds, then the exclusion of plant varieties from patentability appears superfluous. On this basis, in the last 15 years the EPO has granted a number of patents on plants, plant seeds and breeding techniques – a number of which have been opposed due to the lax interpretation of patent requirements.10

A common topic in the debate about patenting life forms has been the need to distinguish between inventions and discoveries. Only products or processes that are the result of human intervention should be patentable. However, this principle has been interpreted in a lax manner with regard to biological compounds and processes. European legislation has tried to safeguard the inventiveness step that is required for patenting life forms by forbidding the patenting of processes that are essentially biological, but, in practice, the distinction between essentially biological and human-directed processes is very fuzzy if one looks at how this prohibition has been implemented on a case-by-case basis.11 According to the guidelines for examination in the EPO, ‘a process for the production of plants or animals is essentially biological if it consists entirely of natural phenomena such as crossing or selection.’12 Following this rule, the EPO considers that a method of selecting, crossing or interbreeding is essentially biological and therefore unpatentable. However, the office has granted a number of patents to traditional breeding methods that involve the use of markers and other advanced tools, even if all of the steps in the improvement process are still essentially biological.13
Many developing countries have excluded the patentability of animals and plants in their recent patent laws. This restriction minimizes the probability of subjecting plant varieties to patents and guarantees that there is an extended public domain in comparison to developed countries.

**Failures of the intellectual property system**

In the last few decades, various intellectual property and PVP offices have granted patents and PVP over varieties of plants that were actually in the public domain. It is worth looking at a couple of these examples in detail in order to understand the issues that are involved and how the patenting system has failed. I have selected two famous examples that present different characteristics in terms of the typology of actors involved, the issues concerned, the applicable laws and their resolution. These two cases will be used later to illustrate some of the issues that are related to the defensive publication of plant varieties.

**Ayahuasca case**

The psychoactive plant *Banisteriopsis caapi* has been traditionally used by indigenous peoples in the Amazon region to prepare a ceremonial drink called Ayahuasca (‘soul’s wine’ in the Quechua language). This drink is used in religious and healing ceremonies. It is also used to diagnose and treat illness, communicate with the spirits and predict the future. A tribe from Ecuador gave some samples of *B. caapi* to Loren Miller in 1974, who cultivated them in Hawaii where, he argued, he managed to develop a stable variety. In 1986, Miller obtained a plant patent on a plant called ‘Da Vine,’ which he defended to be a new variety of *B. caapi*. Later, he founded a laboratory to study and exploit the plant’s properties. The Center for International Environmental Law (CIEL), which represented the Coordinadora de las Organizaciones Indígenas de la Cuenca Amazónica (COICA), submitted a request for a reexamination of the patent in 1999, arguing that Da Vine did not meet the novelty requirements since the features described in the claim were typical of the species as a whole and had been described in scientific literature before the patent application was submitted. In addition, the request affirmed that the plant could be found in an uncultivated state and that the patenting of a plant that was sacred to indigenous peoples was against public policy and morality principles. The US Patent and Trademark Office (USPTO) accepted the request because the plant was almost identical to other plants that had been described by the herbarium at Chicago’s Field Museum.\(^\text{14}\) Miller submitted several briefs to the USPTO requesting the office to reconsider its decision. He argued that the herbarium’s description lacked the necessary authority and that their plants demonstrated substantial differences with the flowers, leaves and stem of the Da Vine plant. Due to the regulations controlling patent applications submitted before 1999, the CIEL could not contest Miller’s requests, and in 2001 the USPTO issued
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a notice reversing its earlier rejection of the Da Vine patent claim. They based this decision on some slight variations between the Da Vine plants and those included in the Chicago herbarium, arguing that these variations indicated that the plants described by the herbarium were not the same plant as the Da Vine.15

The scope of protection awarded in a US plant patent is to the single germplasm (i.e. the single and particular plant within the species) and its asexually reproduced progeny. In the case of the Da Vine plant, the differences in the leaves were substantial enough for the USPTO to affirm that it was a unique plant within the B. caapi species and therefore was worth patenting. It is important to highlight that Miller never compared the Da Vine plant with living specimens of B. caapi but only with dry samples from herbariums and written descriptions and drawings in existing literature. No grow test was conducted when the patent was reexamined nor was the molecular characterization examined in order to detect differences between the plants at the genetic level.

The Ayahuasca patent, which is perhaps the most famous case of misappropriation, had far-reaching consequences that went well beyond the CIEL’s and the COICA’s concerns. It resulted in political conflict between the United States and Ecuador and increased general concern about the reliability of the US patent system. It also raised considerable concern over the moral issue of patenting indigenous’ communities’ sacred plants and knowledge (Center for International Environmental Law, 1999).

Enola bean case

In 1999, the USPTO and the US PVP office granted a patent and a PVP certificate, respectively, to Larry M. Proctor for a common field bean called Enola. In the patent application, Proctor explained that he had bought some beans in a market in Mexico and, after few years of planting, had developed ‘a new field bean variety that produces distinctly colored yellow seed which remain relatively unchanged by season.’ Several organizations denounced the Enola patent, including the International Centre for Tropical Agriculture (CIAT), the Food and Agriculture Organization (FAO) and the nongovernmental organization ETC Group. CIAT was able to dispute Proctor’s claims by providing evidence of 260 yellow beans among the samples of beans conserved in its gene bank, and it also presented several scientific articles on yellow beans that showed the existence of prior literature. In the course of the patent revision, several studies showed Enola’s near to complete identity with preexisting Mexican Peruano-type cultivars commonly grown by Latin American farmers as well as the identity of the yellow seed colour genotype with that of existing yellow bean cultivars documented in scientific literature prior to the patent application (International Centre for Tropical Agriculture, 2002; Pallottini et al., 2004). Azufrado Peruano 87, which was released for the first time by the Mexican Ministry of Agriculture in 1987 and described in an article by Perez Salinas and
Ildefonso Lepiz in 1983, was shown to have an identical genetic fingerprint as the claimed Enola seed. The USPTO issued a preliminary decision in 2003 rejecting all patent claims and gave a final rejection in December 2005. Proctor filed an appeal through the USPTO, and the patent remained in force while the appeal was being considered by the Board of Patent Appeals and Interferences. The board finally rejected all of the patent claims in April 2008, 9 years after Proctor had started to exploit the patent by claiming US$0.6 for every pound of yellow beans sold in the United States. This decision was confirmed by the US Court of Appeal for the Federal Circuit in July 2009. The PVP certificate is still valid.

The Enola bean case has raised serious concerns for the CGIAR, a global partnership that unites 15 centres engaged in agricultural research, as well as for other international organizations involved in the conservation and use of genetic resources. These groups were not only worried about the immediate economic impact of the patent, but they were also particularly alarmed over whether the patent would establish a precedent that would threaten public access to plant germplasm that is held in trust by the CIAT as well as by other international research centres worldwide. As a result, the CGIAR centres have started to recognize the need to adopt preventive actions to avoid future cases of misappropriation (International Centre for Tropical Agriculture, 2008).

In addition to these two well-known cases, there have been various attempts to patent plant varieties in the public domain that have failed in the end. In several cases, this failure was a result of prior art that showed the lack of novelty of the claims. One example is the patent application on a warted pumpkin. In February 2009, the ETC Group denounced the patent that was being claimed by the Siegers Seed Company on a warted pumpkin, which was identified as having at least one wart associated with the outer shell of the body (ETC Group, 2009). The patent application included 25 broad claims covering a range of pumpkins with bumpy surfaces, a range of wart sizes relative to the pumpkin’s surface and a range of wart colours. It also included specific varieties and plants, seeds as well as the tissue of warty pumpkins. The patent was rejected for a number of reasons, including a sloppy application, the prevalence of warts on cucurbits historically and the fact that warted pumpkin seeds have already been available from other vendors.

There are also a number of cases where patents have been granted on the use of plants that were almost identical to the traditional uses of those plants, therefore lacking enough inventiveness to deserve patent protection. For example, one well-known case is the turmeric patent. Turmeric is one of the most basic ingredients of Indian food, and its antiseptic properties are widely known. In 1995, two researchers based at the University of Mississippi were awarded a patent on the use of turmeric for healing wounds, which consisted in administering turmeric powder topically or orally. The Indian Council of Scientific and Industrial Research challenged the patent on the ground that the alleged invention was part of the public domain in India. The patent was reexamined, and all former claims were cancelled.
It is difficult to provide an approximate number of cases of uncertain patents and PBRs. We only know those cases where there have been claims against the application or the patent itself. There could be a number of incorrect patents or PVPs that have passed unnoticed because they have escaped the attention of interested groups or because these groups do not have enough resources to enter into the revision procedures. Taking into consideration the fact that PBRs for ornamental crops account for more than half of the total applications granted in both the United States and Europe, and the fact that plant-related utility patents are a recent phenomenon, the number of applications that try to subject landraces and traditional farmers’ varieties to patents and PVP should not be very high (Koo, Nottembur and Pardey, 2004). However, the literature produced by nongovernmental organizations (NGOs) and governmental agencies committed to fighting questionable patents argues that numerous patents and PVP certificates should be revised because they refer to plants and plant uses that could be in the public domain before the patents and PVP were requested. For example, the task force established by the Department of Indian Systems of Medicine and Homoeopathy in 2000 estimated that about 2,000 wrong patents concerning Indian systems of medicine were being granted every year. This prompted the Indian authorities to create a public database, the Traditional Knowledge Digital Library (TKDL), which could serve as register of prior art (Gupta, 2011). Since then, the Indian government has signed an agreement with the EPO, the USPTO, the Japan Patent Office (JPO), the German Patent Office, the Patent Office of Australia, the Canada Patent Office and the United Kingdom Trademark and Patent Office to make the TKDL available for patent examination procedures (Indian Council of Scientific and Industrial Research, 2011). As a result, according to the records of TKDL, around 170 patent applications have been withdrawn by their applicants or rejected by the patent offices based on information provided by the TKDL (TKDL, 2014). In Peru, the National Commission Against Biopiracy systematically reviews patents and patent applications that are based on genetic resources for which Peru is a source of diversity. So far, they have identified 13 patents or patent applications (referring to five plant species) that, according to their knowledge, do not meet the novelty requirement since they are plant-based uses in the public domain in Peru. In the last years, the commission has prevented foreign companies from obtaining seven patents related to the use of Peruvian traditional knowledge on plants (Comisión Nacional contra la Biopiratería, 2013). In 1998, the international NGO Rural Advancement Foundation International, together with the Heritage Seed Curators Australia, published a report on irregular plant variety protection grants and applications at the Australian Plant Breeders’ Rights Office and a number of other patent and plant breeders’ rights in other industrialized countries (Rural Advancement Foundation International, 1998). They identified 147 cases that had significant irregularities, of which 124 were presumed farmers’ varieties from at least 43 countries and seven International Agricultural Research Centres (ibid.).
Protecting the public domain through defensive publishing

In view of this situation, defensive strategies aimed at preventing the granting of intellectual property rights on genetic resources and related traditional knowledge in the public domain have gained more and more importance in the last few decades. In contrast to forms of positive protection, these defensive strategies seek to ensure that third parties do not gain or maintain unfounded intellectual property rights (WIPO, 2007).

Defensive strategies are generally well-established intellectual property practice. There are several different strategies, but all of them rely on the same principle: by disclosing an invention it is placed in the public domain and, in this way, renders any identical invention ineligible for patenting or sui generis protection because of lack of novelty or uniqueness.

Patents and defensive publishing

Patents are granted to inventions that satisfy the requirements of utility, novelty and nonobviousness. An invention is novel when it does not form part of the state of the art – that is, when it has not been disclosed to the public before the patent application. The nonobviousness requirement states that the invention will be patentable only when it is not an obvious consequence of applying the existing prior art by a person skilled in the subject matter. In order to determine the novelty and nonobviousness of the claims described in a patent application, patent examiners conduct a search of prior art by way of a literature exploration. In doing this search, patent examiners may ask the patent applicant to provide additional information about the invention and point out any prior art in the relevant literature. They may also consult with experts in order to fully understand whether the claimed invention is new and nonobvious, particularly for patent applications involving complex technologies.

The actual scope of prior art differs from country to country. In the United States and Japan, prior art includes everything that is known or used by people in these countries or described in a publication distributed in these countries or in any other country. This means that unpublished knowledge or use in a foreign country may not prevent patentability. Similarly, the Patent Cooperation Treaty limits the scope of prior art to ‘everything made available to the public anywhere in the world by means of written disclosure.’ In Europe, prior art extends not only to publication but also to oral description, use or any other way of disclosure utilized anywhere.

In reality, practical reasons limit the actual scope of prior art to published documents. Lack of published documentation on the existence of a certain invention may indicate to a patent or PVP examiner that such an invention is indeed new and worthy of intellectual property protection (Adams and Henson-Apollonio, 2002). Thus, if inventors want to ensure that their inventions are
Defensive publication has traditionally been used as a tool for inventors who are not interested in obtaining a legally enforceable monopoly, but rather wish to make sure that their inventions cannot be patented by someone else. Many corporations use defensive publishing as a part of their intellectual property management strategy. For example, in Japan, it is a relatively common practice to apply for patents for inventions that the applicant does not intend to use but that the inventor does not want to fall into the hands of competitors who may reinvent them. A practical solution is to file a patent application, wait for it to be published and then not continue the application process. In this way, the application will fall into the public domain and will necessarily be taken into consideration by patent examiners when assessing the patentability of claims filed by competitors. The USPTO institutionalized this process by developing a system called statutory invention registration, whereby inventions are published in the form of patent applications and made easily available for prior art searches. Some big companies have opted for developing their own defensive publication tools. The IBM Technical Disclosure Bulletin, which was published from 1958 to 1998, was a technical journal that was well known for disclosing inventions in order to prevent competitor companies from obtaining patents on them. Nowadays, there are a number of companies that provide expertise in defensive publishing and disclose inventions by publishing them in digital publications where patent examiners can easily search for prior art.  

The strategic use of a defensive publication is crucial in countries that have no, or very little, tradition in intellectual property protection. Often in these countries, despite the globalization of intellectual property standards, the majority of innovators are not interested in positively protecting their inventions or are unable to afford the patent application and the maintenance costs. The strategic placement of innovations in the public domain is also important for public research agencies that want to ensure that their research products remain available for everyone. When defensive publications are successful in protecting inventions in the public domain, the inventor, or any other interested person, does not need to intervene at a later stage, thereby saving the cost involved in the revision of a possible inappropriate patent over the invention. For this reason, it is more convenient for the inventors to adopt precautionary measures. An important obstacle for the success of defensive strategies is the fact that patent examiners have to deal with an increasing number of patents and have a limited amount of time for prior art searches. The USPTO and the JPO receive around 400,000 applications per year and the EPO receives approximately 140,000. While in Japan the figure has been more or less constant during the last decade, as shown in Table 11.1, the number of patent applications in the United States and Europe has doubled since 1998 – biotechnology being one of the fields where applications have increased most dramatically.
The limited number of examiners in new areas of technology such as biotechnology have been overwhelmed with this current number of applications and there is a risk that they will not be able to dedicate enough time to their prior art searches. In the USPTO, a patent examiner spends an average of 21.2 hours on a full application review (US Patent and Trademark Office, 2007). The Patent Public Advisory Committee, a committee created to advise Congress on the goals and performance of the USPTO, has repeatedly pointed out to the lack of enough patent examiners capable of dealing with the increasing number of patent applications (US Patent and Trademark Office, 2013). Some critics also denounce these examiners’ lack of necessary skills in the new technologies, which can be partially explained by the USPTO’s inability to compete with corporations and law firms that offer examiners much greater salaries than the US government pays (Jaffe and Lerner, 2004).

An interesting proposal that has been suggested to overcome the current limitations of overwhelmed patent offices is the establishment of an online peer review system to help patent examiners find the right prior art and access those experts who can provide advice on the application (Noveck, 2006). The USPTO has been testing this system since January 2007, through a pilot project called ‘Peer to Patent,’ which encourages the public to review published patent applications that have been volunteered online and submit technical references and comments on what they believe to be the best prior art to consider during the examination. The Australian and the Japanese patent offices have also started

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<td>Average annual number of patents granted in the area of biotechnology (1998–2012)</td>
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Pilot projects to test the convenience of the peer-to-patent system in their countries. If widely adopted, the peer-to-patent system could be an effective channel to make defensive publications available to patent examiners.

PVP and defensive publishing

According to *sui generis* systems inspired by the UPOV Convention, a plant variety can be subject to PBR if it is new, distinct, uniform and stable. The meaning of new is different in patent law and in plant variety protection law. While in patent law novelty refers to the uniqueness of the invention, in the context of PBRs the novelty requirement is limited to commercial novelty; a variety is considered new when it has not been sold or used for more than one year prior to the application date. For this reason, unlike in the context of patents, defensive publishing strategies to prevent unfair PBRs are based not on the novelty requirement but rather on the distinctness requirement.

The UPOV Convention states that ‘the variety shall be deemed to be distinct if it is clearly distinguishable from any other variety whose existence is a matter of common knowledge at the time of the filing of the application.’ Therefore, the fact that a variety is distinct is what makes it unique, different from the existing varieties and therefore new, in an absolute sense, and worth protecting.

When plant variety protection officers receive a PBR application, they conduct an examination to assess the distinctness, uniformity and stability of the candidate variety, comparing it with similar existing varieties. In the course of the examination, the authority may grow the variety, carry out other necessary tests or take into account the results of growing tests or other trials that have been carried out already. The UPOV General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants states that authorities need to examine distinctness in relation to all varieties of common knowledge (International Union for the Protection of New Varieties of Plants, 2002). However, field trials may not be needed whenever a candidate variety can be distinguished in a reliable way from varieties of common knowledge by comparing documented descriptions. In order to help the examination process, the PVP office requests the breeder to provide certain information about specific distinguishing characteristics, information on the breeding scheme of the candidate variety and any other information that may help to distinguish the variety. The breeder is also requested to identify similar varieties and characteristics by which the candidate variety may be distinguished from the existing ones.

Existing literature on defensive publishing does not address the use of defensive publishing in the context of *sui generis* systems for the protection of plant varieties. This fact may be due not only to the limited scope of PVP as a *sui generis* system but also to the particularities of the US system with regard to PVP. In the United States, new plant varieties can be subject to three different
types of intellectual property rights: utility patents, PVP (according to the Plant Variety Protection Act enacted in 1970) and plant patents (according to the Plant Patent Act passed in 1930). Utility patents can be granted on all types of inventions involving plants, including new plant varieties; PVP offers protection to new varieties of sexually reproduced or tuber-propagated plant species; and plant patents are limited to new varieties of asexually reproduced plants (except tubers).

The extent of protection varies, with utility patents being the form that provides the strongest protection for plant varieties. The requirements for obtaining a plant patent are the least strict of the three regimes, and the protection granted by this intellectual property right is the narrowest. The asexual reproduction requirement limits plant patent infringement to the narrow circumstance where the stock from the patentee’s original parent plant is obtained and asexually reproduced. Independent breeding of a variety that closely looks like the subject of a plant patent is not considered infringement, nor is seed propagation or sexual crosses of the plant.

The US plant patent shares some of the requirements for PBR. Like plant variety protection, a variety must be new – meaning that the plant variety has not been sold or used for more than one year prior to the application date – and distinct. However, unlike PVP, plant patents do not require that the plant variety be uniform and stable. The process of examining and granting a plant patent is much closer to that of a utility patent. The plant patent examiner compares the description of the claimed plant with the closest available prior art. Unlike in PBR and similarly to utility patents, the process relies almost exclusively on existing literature and does not involve growing trials to compare the candidate variety with existing ones. In general, if the disclosure of the application does not distinguish the claimed plant from those previously known, the claims will be rejected as failing to showing distinctness of the candidate plant.

Several studies have analyzed how companies design their protection strategies in view of the existing parallel systems and have offered interesting conclusions that point towards a clear preference for utility and plant patents and a limited use of PVP. Some of these studies conclude that PVP does not stimulate research and development in the United States, particularly for important crops such as wheat, maize and soya (Alston and Raymond, 2002; Janis and Kesan, 2002). It seems that the main reason the United States maintains the PVP system is because of the advantages that it derives from being a member of UPOV, in particular, the benefits of national treatment and a 12-month right of priority (Janis and Kesan, 2002).

However, defensive publication in the context of PVP is still important in those countries where plant varieties are not eligible for patenting – that is, in most of the countries of the world or in those countries where PVP is already the property right form that is most commonly sought to protect plant varieties. Due to the UPOV Convention’s very specific and strict examination trials with respect to the distinctness, uniformity and stability (DUS) conditions of the candidate plant varieties, the possibilities for obtaining a PBR on a
Defensive protection of farmers’ varieties

plant variety that is already in the public domain are minimal if the examination is conducted properly. However, there have been several cases involving irregular PVP certificates, some of them showing a clear failure of the PVP national system, such as the Enola bean case discussed earlier. Many NGOs have denounced situations in which farmers’ varieties have been misappropriated through PBR.32

Criteria to describe farmers’ varieties in defensive strategies

For practical reasons, the description of farmers’ varieties in defensive strategies must take into consideration the definition of plant variety in the patent and PVP systems, bearing in mind that the criteria that are needed to articulate a general definition of plant variety are different and independent from the criteria required by these systems to grant protection on plant varieties.

The UPOV Convention’s definition of plant variety, which has been adopted with few changes by most national legislation in regard to both patents and PVP, reads as follows:

‘Variety’ means 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.33

According to this definition, a plant variety must be distinct – that is, it must be different from all other existing varieties – in order to be considered as such by patent or PBR examiners. Does this mean that defensive publications need to show that farmers’ varieties are distinct in an absolute sense? In my opinion, this is not necessary. The objective of the defensive publication is to provide evidence that a farmer’s variety exists by making available enough information about the identity of the variety, but it does not need to prove that the variety is unique. The description of a farmer’s variety in a defensive publication has to show those characteristics that make it distinguishable from similar varieties found in a limited geographical area, but it does not need to prove that the variety is different from all of the existing varieties worldwide. The fact that other identical varieties could be found, perhaps with different names, in different geographical regions should not disqualify a farmer’s variety as a variety of common knowledge or of prior art as long as it has been properly documented in a publication. It will be the responsibility of the patent or PBR applicant to show that the candidate
variety is different from the other documented varieties, and the patent or PBR examiner will need to confirm that this is so. After all, those publishing farmers’ varieties with defensive objectives are not seeking to establish that their varieties are universally distinct or unique – this is obviously only required if they were seeking to have exclusive property rights. All they are asserting is that this variety exists at this moment in time, so that others may not claim to have developed it themselves de novo or that it is universally distinct or unique.

The use of new methods of varietal identification that allow for pinpoint differences at the genetic level raises questions about how distinctness between a new variety and the existing ones should be measured and what minimum level of difference between varieties should be accepted as being indicative of distinctness. Should differences at the genetic level be taken into consideration when they do not translate into observable morphological differences? Do morphological or agronomical differences that are not recognizable at the genetic level through molecular identification make a plant variety distinct? These questions are particularly relevant when dealing with farmers’ varieties since it is not uncommon that the traits that are most important to farmers for distinguishing a variety are not the same ones used by the researcher to distinguish varieties genetically. For example, Busso et al. (2000) found that the traits that Ugandan farmers use to distinguish different varieties of pearl millet do not lead to genetic identity at the molecular level.

The rapid development of different techniques for genetic mapping, their proven efficiency in uncovering the diversity within plant species and identifying the differences between cultivars at the genetic level and the dramatic decrease of some of the costs of these techniques have brought to the forefront the question about what extent they can be used, or should be used, for DUS testing. A number of scholars have defended the benefits of using molecular markers in DUS testing processes when these techniques are shown to be more rapid and cost-effective than the classic comparison of morphological traits between candidate varieties and existing ones (Morrell et al., 1995; Giancola et al., 2002; Noli et al., 2008). On a number of occasions, national courts have requested the application of these techniques to solve cases where the morphological traits were not sufficient to distinguish closely related genotypes (Kumar et al., 2000) or they have accepted scientific studies that provide evidence about genetic differences between similar varieties. However, there is a general consensus among experts that DNA fingerprints must not fully replace morphological traits, given that the distinctness identified by molecular markers may not necessary reflect morphological distinctness. This was the position adopted by the International Seed Federation in 2009 and reiterated in 2012 (International Seed Federation, 2012). The federation strongly endorses the use of DNA-based markers for variety identification purposes (e.g. in the case of enforcement of intellectual property rights) and to help determine genetic similarity between varieties in disputes on essential derivation. Its approach to the use of DNA-based markers in the DUS testing is much more cautious: the federation holds that DNA-based markers can be useful in the DUS testing
and examination process whenever DNA-based makers are fully predictive of the expression of phenotypic characteristics, and that their use alone for establishing DUS could significantly decrease the scope of protection and should therefore not be accepted.

This topic has received much attention at UPOV in the last decade. Finally, in 2013, based on the recommendations of the Working Group on Biochemical and Molecular Techniques and DNA Profiling, the UPOV Council adopted UPOV’s guidance on the use of biochemical and molecular markers in the examination of distinctness, uniformity and stability (UPOV, 2013). According to this guidance, the use of molecular markers in DUS testing are acceptable in the following two cases:

1. for examining DUS characteristics that satisfy the criteria for characteristics set out in UPOV General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants, if there is a reliable link between the marker and the characteristic;
2. where a combination of phenotypic differences and molecular distances can be used to improve the selection of varieties to be compared in the growing trial provided the molecular distances are sufficiently related to phenotypic differences, and the method increases the risk of not selecting a variety in the variety collection which should be compared to candidate varieties in the DUS growing trial.

The examples of the Ayahuasca plant and the Enola bean demonstrate that molecular techniques may be particularly useful in PVP and patent examination and reexamination procedures where the morphological characterization does not offer definitive responses about a plant’s identity. The possibility of using irrefutable evidence provided by genetic information may increase objectivity and certainty in the examination process. The morphological and agronomical description of several varieties of yellow beans in prior art literature was not enough for the USPTO and the PVP office to deny novelty and distinctness of the Enola bean and Da Vine plant respectively. The Enola bean patent was eventually revoked because the Board of Patent Appeals and Interferences of the USPTO considered recent studies showing genetic identity between Enola and several existing varieties of yellow bean by using molecular markers (Pallottini et al., 2004).

In the case of the Ayahuasca plant, the USPTO examiners confirmed the patent on the Da Vine plant because they concluded that the differences in the leaf size showed that the Da Vine variety and B. caapi did not share the same germplasm and were therefore genetically different, even if in its previous decision the office had accepted that such morphological differences were very probably due to the plasticity of the plants and not to actual differences at the genetic level. If the PVP examiners had applied molecular techniques to check out the genetic differences between Enola and other varieties of yellow beans, the PVP certificate would have probably never been granted.
Key components in defensive strategies to protect farmers’ varieties

A good description of the variety

A detailed description of a farmer’s variety is a key condition for it to be considered prior art or a plant variety of common knowledge. Without such a description, there is no possible way to challenge novelty and distinctness requirements in patent and PBR applications. As highlighted earlier, characteristics used to describe a farmer’s variety in a defensive publication should be those that allow it to be distinguished from similar ones. They should be easily observable at several different stages of the plant cycle and fairly consistent across generations. This does not mean necessarily that the variety has to be stable according to the requirements for protection under the UPOV Convention, but rather that its key morphological characteristics must be transmittable through genetic heritage and not solely a result of the way a genetically identical plant grows in a different environment. Otherwise, it would be difficult for patent and PVP examiners to recognize different plants that belong to the same variety.

It is important that the morphological and agronomical traits of the variety are described in detail following internationally acceptable descriptors, such as the List of Multi-Crop Passport Descriptors developed by the FAO and the International Plant Genetics Resources Institute, and that characteristics such as the shape of the leaves and stem and the colour of the flower petals, fruits and leaves are presented according to acceptable standards. In addition to providing quality, certainty and transparency and facilitating a clear understanding between plant users, the use of commonly accepted descriptors and standards makes it easier to analyze plant varieties with respect to novelty and distinctness.

It is recommended that the records of the variety also include photos and drawings and that they indicate where living samples of the plant and seeds or other reproductive material can be obtained. This information will not only show that the plant is already publicly available but also will help the examiner find plant samples if necessary (Boettiger and Chi-Ham, 2007).

Defensive strategies for farmers’ varieties must take into consideration that, while the only element to be protected by a PBR is a plant variety, patents can also protect single plants and their parts, including tissues, chemical compounds, genes and so on. Breeding processes are also patentable, as long as they are not considered to be biological processes by patent examiners, as well as the uses of plants and plant components. For this reason, a defensive publication that is aimed at preventing patent grants on farmers’ varieties should provide not only a detailed description of the variety but also a description of other elements that could be subject to patent claims, such as breeding techniques associated with the plant variety, its agronomical and other uses and, if possible, any useful chemical compounds that can be derived from it. Obviously, there is a limit to what defensive publishing can cover and achieve. A good morphological description of a farmer’s variety and of its common uses and associated
breeding practices may provide very little protection when faced with a patent application claiming the use of plant chemical processes and compounds that are the result of advanced scientific knowledge and technologies. The novelty of such patent claims can be very difficult to challenge, and the wisdom of questioning such claims questionable when the claims present a novel, not obvious and useful application or use of the plant components.

One of the biggest challenges for defensive publications is language. In general, documents that are not written in English will rarely be taken into account by patent and PBR examiners in the largest intellectual property offices. For this reason, it is highly recommended that the descriptions of farmers’ varieties include a summary or abstract in English or, at the very least, a list of English keywords that will help the examiner assess the relevance of the publication as prior art and make a decision about translating it into a language that he or she can understand.

Another issue that concerns defensive publication is whether defensive publications should provide molecular information in order to effectively describe farmers’ varieties. In the case of landraces, demonstrating their genetic identity would not only be expensive but also extremely difficult, if not impossible. Farmers’ varieties are usually made up of genetically variable populations (Halewood et al., 2005, citing Zeven, 1998), and thus it would prove very challenging to obtain reliable, sufficiently exhaustive molecular-level information to prove the existence of a distinct, yet genetically diverse population. For this reason, plant descriptions in defensive publications should continue to rely primarily on phenotypic characteristics.

Making defensive publications easily reachable by patent and PVP examiners

Since examination procedures are different for patents and PBRs, defensive protection efforts may need to adopt different strategies to ensure that published information concerning farmers’ varieties is accessible by patent and PVP offices.

**PBRs**

The UPOV Convention and the General Introduction to the Examination of Distinctness, Uniformity and Stability both provide key information for determining how a defensive protection strategy has a better chance of ensuring that PVP examiners take farmers’ varieties into consideration as varieties of common knowledge. The convention reads:

> The filing of an application for the granting of a breeder’s right or for the entering of another variety in an official register of varieties, in any country, shall be deemed to render that other variety a matter of common knowledge from the date of the application, provided that the application
leads to the granting of a breeder’s right or to the entering of the said other variety in the official register of varieties, as the case may be.\(^{36}\)

Since the text does not specify what type of official register makes a variety a matter of common knowledge, it can be understood that varieties registered in any official register can be considered common knowledge for all UPOV members as long as they respond to the definition of plant variety in the UPOV Convention. Such registers include the official list of protected varieties, the register of commercialized varieties as well as any existing registers of traditional varieties such as the ones described later in this chapter.

The General Introduction to the Examination of Distinctness, Uniformity and Stability points out that, in addition to the aspects described earlier, the following elements define, among others, varieties of common knowledge:

- if the propagated or harvested material of the variety has been, or is being, commercialized;
- if there are publications providing a detailed description of the variety;
- if there are samples of the variety in publicly accessible plant collections.

The general introduction also clarifies, in the same way as the UPOV Convention, that in order to be considered a variety of common knowledge the variety does not necessarily need to fulfil the DUS criteria required for granting a PBR under the UPOV Convention. A way to ensure that PVP examiners consider farmers’ varieties to be varieties of common knowledge is by: (1) registering them in official registers of traditional varieties or other registers adapted to farmers’ varieties; (2) making samples available in public plant collections; and (3) publishing the description of the varieties in journals or catalogues commonly used by plant scientists.

**Patents**

Patent office search tools are very good at identifying patent literature, but they do not always provide access to all relevant prior art, particularly when it has been published in a foreign country. Defensive publishing depends on the ability of patent and PBR examiners to find publications in nonpatent prior art searches. Stephen Adams and Victoria Henson-Apollonio (2002) provide a comparison between defensive publication mechanisms in the context of patents. Table 11.2 represents their assessment of the accessibility of different mechanisms. The table shows that the current scenario is not very promising for farmers’ varieties. A large proportion of plant variety developers, conservers and users do not have the need or the means to systematically publish the necessary information about the plant varieties that they develop and use. This is not only true for farmers – particularly farmers in developing countries – but also for plant collectors and curators of gene banks and botanical gardens, who have not always kept detailed records of the materials they have collected...
Defensive protection strategies must be aimed at filling these informational gaps with respect to farmers’ varieties by publishing information about existing farmers’ varieties in a way that allows patent examiners to access the information easily. Some of the mechanisms that are ranked well or very well by Adams and Henson-Apollonio are often too complicated to access or unaffordable for a range of actors that are potentially interested in protecting farmers’ varieties through defensive publication, including public agencies in developing countries and small society organizations and farmers. For these actors, a good alternative may be to make their defensive publications known by getting them included in nonpatent literature databases used by the patent offices. The agreement between the International Crop Research Institute (ICRISAT) and the EPO is a good example of how this can be done. In 2005, ICRISAT signed a memorandum of agreement with the EPO allowing ICRISAT to include its publications as part of the EPO’s nonpatent literature. Thanks to this agreement, information and knowledge generated by ICRISAT is being provided to European patent examiners for consultation in prior art searches. About 70 documents produced by ICRISAT have been consulted in prior art searches since the agreement was signed. National agricultural research institutes could

Table 11.2 Comparison of defensive publication modalities

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<th>Self publication</th>
<th>Third-party publication</th>
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<tr>
<td>Institution publicity materials</td>
<td>Moderate to poor</td>
<td>Good to very good</td>
</tr>
<tr>
<td>Institution series</td>
<td>Moderate</td>
<td>Good</td>
</tr>
<tr>
<td>Occasional publications</td>
<td>Generally poor</td>
<td>Very good</td>
</tr>
<tr>
<td>Gray literature</td>
<td>Generally poor</td>
<td>Good</td>
</tr>
</tbody>
</table>

Source: Adapted from Adams and Henson-Apollonio (2002).
pursue the same type of agreement with some of the big patent offices in the world, and they could even explore how regional organizations and networks promoting agriculture research and development could provide coordination and advisory services to interested countries.

A close look at biodiversity public registers and databases

In recent years, there has been a tendency among civil society organizations, research institutes and governmental agencies to develop registers and databases that document the biodiversity and associated traditional knowledge of a given area or a whole country. These registers and databases serve many different purposes, but, in most of the cases, these documentation efforts do not seek to create defensive publishing but, rather, arrive at it by default. Consequently, the actual ability of the registers or databases to perform their role as defensive publications is not clear.

Many of the existing registers and databases focus on local communities’ traditional knowledge. Their primary need is to preserve this knowledge rather than to put it in the public domain or disseminate it outside the original community. For this reason, they have been purposefully designed so that users outside the community cannot access all of the information in the register or database. In this way, the registers do not disclose the information beyond the circle of viewers that is permitted by customary law. These characteristics therefore limit these types of registers and make them unable to function as defensive publications, which is perfectly fine according to their objectives.

Public local registers initiated by research or civil society organizations to document biodiversity and biodiversity’s uses at the local level are becoming more and more popular, particularly in developing countries. The local registers differ very much in terms of their primary objectives, but all of them represent, to a greater or lesser extent, a way of ‘memory banking.’ This term was coined by Virginia Nazarea-Sandoval (1998) to refer to the collection and documentation of farmers’ knowledge for future use and is an analogy to the storage and documentation of germplasm in a gene bank. Memory banking serves to capture and record the cultural dimensions of plant biodiversity, including local names, indigenous technologies and uses associated with different plants and varieties that have been traditionally passed from one generation to another by oral means, for access and management by local communities.

The local registers address a range of objectives, including:

- capturing and recording the cultural dimensions of plant biodiversity;
- recording the present status of biodiversity;
- monitoring changes in ecosystems and genetic erosion;
- documenting the uses of genetic resources;
- protecting genetic resources and traditional knowledge from patenting or PBRs through defensive publication;
Defensive protection of farmers’ varieties

- creating a sense of ownership and empowering local communities in regard to local activities oriented to the conservation and sustainable use of genetic resources and related traditional knowledge;
- perpetuating and promoting the development of ecological knowledge of local communities;
- identifying the conservers of traditional crop varieties and associated traditional knowledge with whom an equitable share of the benefits arising from the use of such resources and knowledge should be shared;
- enhancing the collaboration between people working in research and education institutes, government agencies and civil society organizations and farmers, fishermen and traditional healers.

In India, the People’s Biodiversity Registers had the original objective of documenting community-based knowledge of medicinal plants and their uses, but, after some initial experiments and some early consultations, the registers’ promoters decided to broaden the scope of the exercise to all elements of biodiversity and to record knowledge and perceptions at all levels, from individuals, households and ethnic groups to multiethnic communities (Gadgil, 1996). Currently, these are operative in 12 Indian states. The information recorded in the registers relates to present status, changes over recent years and factors affecting the distribution and abundance of living organisms as well as known uses of biodiversity. They also record the perceptions of local people about ongoing ecological changes, their own development aspirations and their preferences about the management of living resources and habitats (Gadgil et al., 2002).

The main limitations of the People’s Biodiversity Registers for serving as defensive instruments to protect farmers’ varieties are the fact that many of them:

- embrace miscellaneous information on local biodiversity, making it difficult to identify the actual plant varieties and their specific characteristics;
- do not provide enough information about the farmers’ varieties, their uses and the breeding methods;
- do not follow international descriptors;
- even if public, are difficult to access by common people outside the communities and, therefore, are unlikely to be considered in prior art searches.

In Nepal, civil society organizations have promoted the establishment of community biodiversity registers in different regions of the country. Table 11.3 shows the minimum information that is required in registers maintained by communities in the Begnas and Rupa watershed areas.

Compared to the People’s Biodiversity Registers, the Nepalese Community Biodiversity Registers offer information about farmers’ varieties that is much more focused, complete and detailed, although the descriptions of the varieties are often based on the characteristics that are most important for farmers, which are not always the same as the ones internationally accepted by the
Table 11.3 Minimum information required in registers maintained by communities in the Begnas and Rupa watershed areas

| Information on cultivar/breeds/species/varieties | Primarily with consumptive use values. However, it should not mean that the species with nonconsumptive, existence or intrinsic values are undervalued. |
| Existence history (year) | Since which year the particular bioresource exists in the habitats or ecosystems. |
| From where the species was introduced | Name of the original place from where the new bioresources were first introduced. |
| Nature of the species | The nature of the bioresources we defined here as annual, perennial, evergreen, deciduous, herb, shrub, tree and so on. |
| Mode of reproduction | Means of propagation: seed, clones, sapling, stem and leaf. |
| Natural habitats | The natural habitats as recognized by farmers. |
| Extent and distribution | The extent and distribution of bioresources in terms of frequency and area – described as rare (R), medium (M) and widely grown (W). |
| Local techniques | Processing techniques may vary by species linked with product quality. |
| Uses | The bioresources are valued in terms of food, clothes, medicine, religion, culture and so on. These values are described by means of their specific purpose and their significance on certain occasions. |
| Useful parts, stages and times | The sustainable harvest of any local product – each bioresource is defined in terms of harvesting time and cultivation stage. |
| Life cycle | Time of emergence, growth, regeneration and harvest is recorded. |
| Information on custodians | An address is provided for the person who has supplied the following information. |
| Photographs/drawings | Distinguishing characters or useful parts of the recorded bioresource. |

Source: Subedi et al. (2005).

scientific community. Like the Indian registers, the Nepalese registers are very likely to be beyond the reach of patent examiners in their prior art searches or of PVP examiners in their analysis of plant varieties of common knowledge.

National registers covering the whole national territory are more rare. As mentioned in the introduction of this chapter, Peru has recently developed an online register of native potato varieties, which is managed by the National Institute of Agriculture Research (Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)). Another example is the Portuguese
Defensive protection of farmers’ varieties

register of autochthonous plant material, which includes local varieties and spontaneously occurring material as well as associated traditional knowledge, which was created by law in 2002. In terms of information provided, the Peruvian register has more opportunity to function as a defensive publication than the databases and registers described earlier. The main reasons for its success include the following:

- It focuses exclusively on traditional varieties of certain crops. This narrow focus allows it to cover each record with much more detail, and it follows the same unique description system for each type of crop.
- It is comprehensive. It includes descriptions of all of the farmers’ varieties and landraces known in the country.
- The description of each farmer’s variety is very detailed and combines descriptors that are internationally recognized by the scientific community as well as those that are relevant only for farmers, such as taste. The descriptions also include photographs and drawings.
- It is the responsibility of the national public authority that deals with plant genetic resource issues, lending a ‘mark of quality’ to the database and ensuring that it is permanently available and regularly updated in the long term. It also qualifies as an ‘official’ register according to the UPOV Convention.

One significant limitation, however, is that access to the database is not open to the public but must be requested to INIA authorities, which makes it difficult for patent and PVP examiners to use it as a source of information of prior art.

In order to be included in the Peruvian register, potato and maize varieties do not need to pass a formal DUS examination. It is understood that the fact they have been used for decades automatically categorizes them as varieties, as long as their distinctive and valuable traits remain stable, at least to a certain degree, across generations. Their inclusion in the register does not provide any right to the variety holders. However, they can benefit from the efforts made by the INIA to promote the conservation of traditional varieties. For example, the INIA is using the register as a means of certifying some traditional varieties by the National Seed Certification Authority, so that their seeds can be sold as commercial varieties (CIP, Centro Internacional de la Papa, 2008). The necessary requirements to catalogue these varieties as commercial are more flexible than they are for varieties outside the register – DUS characteristics are not required, nor is it necessary to assess the agronomical value since these values have largely been proved by the years of cultivation in farmers’ fields. In addition, the certification is free of charge and does not have to be renewed every 5 years, as is done for nontraditional commercial varieties.

Efforts to document national and local plant genetic heritage and to prevent its misappropriation are not exclusive to the developing world. In Chile, an initiative engaging NGOs, institutions of the academia and other organizations have created a national catalogue of traditional seed which is available through the
websites of the 20 institutions which have participated in the development of the catalogue. The catalogue is a living document which is updated on an ongoing basis. We can find examples of official registers and catalogues of traditional varieties in Portugal (mentioned earlier), France and Italy. In general, the main requirement for introducing a variety in these registers is the provision of a good description of the variety and confirmation that it has been used for a long time and therefore can be considered traditional (see Chapter 10 of this volume). The main purpose of these registers is to maintain information on existing varieties for conservation purposes. Some of them also regulate the commercialization of farmers’ seeds. Table 11.4 summarizes the characteristics of some of these selected registers, highlighting those features that facilitate or hinder their role as defensive mechanisms to prevent the misappropriation of traditional crop varieties.

**Supporting defensive strategies**

According to what we have explained so far, an efficient defensive strategy may often require a capacity and level of resources that goes far beyond what most NGOs and research institutions in developing countries can afford. One way to overcome this limitation is by strengthening the responsibility and support of public agencies. It is essential that those governments that defend the need to conserve and protect their genetic heritage provide sufficient support to registers and databases of plant genetic resources. Indeed, in countries with a long tradition on community-based registers, the registers initially managed by NGOs and community-based organizations at the local level have eventually been integrated in national public supporting programs and received official recognition (Subedi et al., 2013).

The acceptance of developing country databases by foreign intellectual property rights authorities may be easier when governments choose to officially recognize these databases and when the information contained in them is verified in accordance with standard processes. The current patchwork of NGO or community-led biodiversity registers may not be very useful in the context of defensive publication strategies unless they receive official sanction and are subject to standard procedures that ensure their accurateness for defensive strategies.

International agencies can also assist in different ways, and some of them have already adopted measures to support the efforts of developing countries. Following the recommendations of the Inter-Governmental Committee on Intellectual Property, Genetic Resources, Traditional Knowledge and Folklore and as part of its efforts to harmonize intellectual property rights with the protection of genetic resources, traditional knowledge and folklore, the World Intellectual Property Organization (WIPO) has recently been working on the development of a comprehensive and worldwide online database of traditional knowledge and genetic resources that can be used by patent examiners in their prior art searches. This database, which is still in its initial stages, browses information from different online catalogues, including information on traditional knowledge and genetic resources. Currently, this information is not always sufficient or
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<th>Characteristic of selected registers</th>
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<tr>
<td><strong>Objective</strong></td>
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<td>Community Biodiversity Registers in Nepal</td>
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<tr>
<td>• Documentation for conservation and use purposes.</td>
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<tr>
<td>• Monitoring genetic erosion.</td>
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<tr>
<td>• Protection against misappropriation.</td>
</tr>
<tr>
<td>Honey Bee</td>
</tr>
<tr>
<td>• Conservation and diffusion of knowledge.</td>
</tr>
<tr>
<td>• Protection against misappropriation.</td>
</tr>
<tr>
<td>• Adding value to the traditional knowledge.</td>
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<tr>
<td>• Recording information for the purpose of benefit sharing with knowledge holders.</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
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<tr>
<td>Community Biodiversity Registers in Nepal</td>
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<tr>
<td>Each register has its own scope. The most common elements are:</td>
</tr>
<tr>
<td>• traditional plant varieties</td>
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<td>• traditional knowledge</td>
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<td>• forest biodiversity</td>
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<td>• bioresources in general.</td>
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<tr>
<td>Honey Bee</td>
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<tr>
<td>• Mainly traditional knowledge and innovation.</td>
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<tr>
<td><strong>Does it provide a detailed description of the plant varieties?</strong></td>
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<tr>
<td><strong>Does the plant description follow internationally accepted descriptors?</strong></td>
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<tr>
<td><strong>Is it an official register or catalogue (official meaning managed by a state agency)?</strong></td>
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<tr>
<td><strong>Is it in English, totally or partially?</strong></td>
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<tr>
<td><strong>Is it public?</strong></td>
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<tr>
<td><strong>People's Biodiversity Registers in India</strong></td>
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<tr>
<td>• Documentation for conservation and use purposes.</td>
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<td>• Promotion of knowledge-based sustainable management of resources.</td>
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<td>• Adding value to biodiversity resources</td>
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<td>• Protection against misappropriation.</td>
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<tr>
<td>• Recording information for the purpose of benefit sharing with knowledge holders.</td>
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<tr>
<td><strong>Register of Native Varieties of Potato in Peru</strong></td>
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<tr>
<td>• Recognition of traditional varieties as Peruvian genetic heritage.</td>
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<td>Register of Autochthonous Plants of Portugal</td>
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<td>Objectives/Scope</td>
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<td>Objective</td>
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<tr>
<td>Catalogue of Local Varieties in Tuscany (Italy)</td>
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<td>Catalogue of Traditional Seeds of Chile</td>
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</table>

1. The network is managed by the following organizations: the Society for Research and Initiatives for Sustainable Technologies and Institutions, the National Innovation Foundation, the Grassroots Innovation Augmentation Network, the SEVA (Madura), the Privi, PEDES (Kerela), the Innovation Club (Orissa), and the Network of Gram Vidyapeethas.


3. According to applicable legislation, local varieties are genetic resources (including species, varieties, cultivars and populations):
   - originated in Tuscany;
   - came from outside Tuscany but traditionally integrated in the regional agriculture;
   - emerged derived from the previous ones;
   - are no longer present in Tuscan agriculture but conserved in botanical gardens or research institutions.


6. In several websites, for example: www.terram.cl/images/DOCotros/catalogo-semillas-tradicionales-de-chile.pdf.
available in a user-friendly format due to the fact that it includes records coming from many different sources, presented in different formats and dealing with very different topics. WIPO could play a valuable role in setting standards in the development of biodiversity databases and registers that seek to work as defensive publications as well as in facilitating the negotiation of agreements between intellectual property offices and the authorities in charge of these databases.

The establishment of an information system that supports the objectives of the multilateral system on access and benefit sharing under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) opens the door for another multilateral tool for defensive strategies. Such information system will eventually make information on the accessions of germplasm included in the ITPGRFA’s multilateral system publicly available. It may be worth exploring how this huge database can serve the defensive purposes of farmers’ varieties and combine the coordinated efforts of the ITPGRFA and WIPO.

Conclusions

By disclosing farmers’ varieties to the public through defensive publication, the public nature of such varieties can be protected against misappropriation through patents or PBRs. However, not all publications are created equal, and many publications do not meet the necessary conditions for defensive protection. In order to be effective, defensive protection strategies must rely on some key elements delineated by the legislation on patents and plant variety protection and by patent and PVP examination practices. The core of a defensive protection strategy must be a detailed description of the farmer’s variety in a public document. Such a description should always include those characteristics that make the variety distinguishable (but not necessarily distinct) from other similar varieties. Making the publications easily accessible to patent examiners is also a key element of defensive protection strategies. There are numerous ways to get defensive publications included in examiners’ nonpatent literature searches, such as by signing agreements with patent offices. The USPTO pilot project ‘Peer to Patent,’ which is also being tested by the Australian and Japanese patent offices, may also be a promising channel.

Local and national registers of biodiversity could integrate these elements into their usual operations in order to effectively serve as defensive publications and therefore protect farmers’ varieties against unfounded intellectual property rights. However, this shift may change their original scope and way of functioning. In order to increase the efficiency of defensive strategies, governments should provide public support for the development and maintenance of registers as well as for the negotiation of possible agreements with intellectual property offices. They should also encourage the development of a monitoring system that ensures that the genetic resources described in the registers are not misappropriated. Intergovernmental agencies and agreements such as WIPO and the ITPGRFA can explore various avenues of operation whereby they can support national efforts to protect their genetic heritage in the public domain.
I would like to finish with a word of caution. Ultimately, defensive protection is only a tool used to protect the public nature of goods available in the public domain and to ensure that information about these goods is made easily available to the public. It is worth noting that defensive protection is not the appropriate tool to deal with issues commonly raised in regard to plant patents and plant-derived product patents, for example:

- the extension of patent protection on plant varieties;
- the lax interpretation of patent requirements in plant innovation;
- the general lack of recognition or compensation for farmers and indigenous communities when new products are based on traditional plant species and varieties or on ancestral knowledge;
- the difficulties that arise in establishing a clear line between common knowledge and novelty in many patents involving the use of traditional knowledge in the use of plants;
- the use of genetic resources and traditional knowledge in patented products without consulting the countries of provenance and the holders of the resources and the knowledge;
- the incapacity of current intellectual property system to adequately protect traditional plants and knowledge.

Defensive strategies may somehow support wider initiatives to deal with these issues, but they themselves do not promote any significant change in current intellectual property schemes. Instead, defensive publication works to reduce the failures, inefficiencies and/or inequities of existing patent and PBR systems.

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I would like to thank Michael Halewood for his general guidance and useful discussions, Alejandro Mejías for helping me in putting together Table 11.3, the anonymous peer reviewers and Kay Chapman for their thoughtful comments, Rolf Jördens for a nice conversation on the UPOV Convention and DNA fingerprinting and Victoria Henson-Apollonio for helping me navigate the labyrinth of the Enola bean case.

Notes

1 The register was officially recognized by Ministerial Resolution no. 0533–2008-AG, Lima, 1 July 2008, published in El Peruano, 3 July 2008.
2 Berne Convention for the Protection of Literary and Artistic Works, 9 September 1886, online: <www.wipo.int/treaties/en/ip/berne/trtdocs_wo001.html> (last accessed 3 June 2014), Article 18:

   (1) This Convention shall apply to all works which, at the moment of its coming into force, have not yet fallen into the public domain in the country of origin through the expiry of the term of protection. (2) If, however, through the expiry of the term of
protection which was previously granted, a work has fallen into the public domain of the country where protection is claimed, that work shall not be protected anew.

3 See, for example, D. Lange (2003), J. Boyle (2003) and E. Samuels (2002).

4 In re Bergy, 596 F.2d 952 (C.C.P.A. 1979): ‘Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.’


10 See, for example, Patent EP 1069819 on a method for the selective increase of anticarcinogenic glucosinolates in Brassica species, which is currently pending decision at the EPO Enlarged Board of Appeal, the highest court at EPO. This patent was granted in 2002 by the EPO to Plant Bioscience, a UK company, on the breeding methods, the broccoli seeds and the edible broccoli plants obtained through these breeding methods. In 2003, the plant breeding companies Limagrain and Syngenta filed oppositions arguing that the patent claims refer to an essentially biological process, which is not patentable under the EC Directive 98/44 on the Legal Protection of Biotechnological Inventions and Article 53(b) of the European Patent Convention. Another similar case is the patent EP 1211926 on the method for breeding tomatoes having reduced water content and the product of such method, which belongs to the Ministry of Agriculture of Israel. This patent is also pending consideration by the EPO Enlarged Board of Appeal after the opposition submitted by the Dutch company Unilever, which is based on the same arguments as the broccoli case. All official documents related to these two patents can be found in the European Patent Register, online: <www.epo.org/searching/free/register.html> (last accessed 3 June 2014).

11 According to the European Patent Convention's guidelines for examination, whether or not a process is essentially biological depends on the level of human intervention in the process and its impact on the results. In Decision T320/87 on Hybrid Plants/LUBRIZOL, Doc. EP-A 4 723, OJ EPO 1990, 71, the EPO Board of Appeal concluded that the claimed processes to produce hybrid plants did not constitute an exemption to patentability. Even though none of the steps implied enough human intervention, the process design did since the steps would not have been combined in such a manner without human intervention.

12 See European Patent Office (2013, section 5.4.2).

13 See, for example, Patent EP 0483514 on the use of molecular markers in tree breeding, which involves one of the most common methods in genetic fingerprinting: the restriction fragment length polymorphism (RFLP) for the selection of trees. Claim 1 reads:

A method of forest tree breeding wherein RFLP technology is applied to samples of tree material from a plurality of forest trees; the data derived from said RFLP technology is statistically analyzed thereby to cluster genetically similar trees of said plurality of say trees; two of said trees of genetic diversity are selected based on
the statistically analyzed RFLP data; and a further tree is/are derived from the two selected trees.


18 Plant Variety Protection no. 9700027. Information about the variety and the PVP certificate can be found in the National Plant Germplasm System of the US Department of Agriculture, online: <www.ars-grin.gov/cgi-bin/npgs/html/showpvp?vpvno=9700027> (last accessed 29 May 2014).


20 Some countries recognize a general so-called grace period that offers a specific period of time in which a patent application may be filed despite a previous disclosure of the invention. In this way, the grace period avoids the consequences of an inconsiderate publication. US, Japanese, Canadian, Russian and Chinese patent laws include a general grace period. In contrast, the European Patent Convention and the patent laws of most European Union member states do not offer a grace period – that is, every publication that makes an invention available to the public before the date of the patent application eliminates its novelty. Although Article 55 of the European Patent Convention does recognize a specific grace period for abusive publications that have been made in spite of confidentiality agreements. Only New Zealand applies local novelty, which means that only publications, uses or sales that have taken place within the national jurisdiction are capable of destroying novelty.


23 Patent Cooperation Treaty, supra note 7, Rule 64.1 on Prior Art for International Preliminary Examination.

24 Convention on the Grant of European Patents, supra note 7, Article 54.

25 See, for example, <http://IP.com> (last accessed 29 May 2014).

26 From 2002 to 2006, the patent offices of the United States, Europe and Japan have received an annual average of 75% of the total number of patent applications worldwide. The other countries increased their applications on average by 15% per annum. A large amount of this growth was made by China and South Korea – their combined share went up from 11% in 2002 to 20% of all filings in 2006. In 2009, 85% of the 7.3 million patents in force were valid in the jurisdictions of the European Patent Office, the Japanese Patent Office, the Korean Intellectual Property Office and US Patent and Trademark Office. See Trilateral (2007) and (2010), online: <www.trilateral.net/index.html?sessionid=kJ7rscdht6e6> (last accessed 29 May 2014).

27 Peer-to-Patent pilot project, online: <www.peertopatent.org> (last accessed 10 January 2015).

28 UPOV Convention, supra note 6, Article 7.

Plant patents are preferred by the US nursery industry, particularly for fruit trees such as apples, peaches and tangerines as well as by flower breeders, while utility patents have become the mechanisms of choice for patenting plants, especially for high-tech, genetically engineered plants and plant parts. See Rural Advancement Foundation International (1995).

In the United States, the number of PVP applications under the PVP Act, supra note 29, has never been higher than 450 per year. In the period 2003–7, the average number of applications per year was around 1,350 in Japan, 1,000 in China, 350 in Australia, 250 in France and 200 in Argentina. The total number of PVP and plant patent applications in the United States for this period was 7,416, while the number of PVP applications in the European Community for the same period was 13,617 (International Union for the Protection of New Varieties of Plants, 2008).


See, for example, the Enola bean case described earlier in this chapter.

Citation of Prior Art, 35 U.S.C. § 163, states: ‘In the case of a plant patent the grant shall be of the right to exclude others from asexually reproducing the plant or selling or using the plant so reproduced.’ Therefore, the scope of protection awarded in a US plant patent is to the single germplasm of the subject plant and not to a range of plants having similar characteristics. In Imazio Nursery v Dania Greenhouses, 69 F.3d 1560–67 (Fed. Cir. 1995) (a case referred to by the USPTO in the Da Vine process), the court ruled that a plant breeder could sue for plant patent infringement only if the infringing plant was an asexual reproduction of the protected plant – that is, if it shared the same DNA. In this way, the court confirmed that plant patent protection extends only to a single germplasm and its asexually reproduced progeny.

This is a case of the Honeybee Network, which is an example of a database on grassroots innovations and contemporary and traditional innovative practices, mainly from India. Before uploading the information in the digital database, innovators decide the amount of information they want to publicize. Another example is the register of the Potato Park in Peru. Here, the ONG Andes and the indigenous communities have developed a database that has different thresholds of accession depending on the type of information that they want to store.

Several authors have highlighted the risks of placing traditional knowledge in the public domain through open-access databases (Berglund, 2005; Argumedo and Pimbert, 2007). The most obvious one is when it is impossible for the knowledge holder to get a positive protection over it. Another consequence is that, once the traditional knowledge is made public without restrictions, its use outside the original community is very difficult to control, limiting the community’s ability to apply their own institutional and customary laws and to get compensation from the use of such knowledge.

The People’s Biodiversity Registers in India were initiated by the Foundation for the Revitalization of Local Health Traditions and the Centre for Ecological Sciences. Later, they were included in the Bioversity Conservation Prioritization Programme of the Worldwide Fund for Nature in India.

Online: <www.inia.gob.pe/ente-rector/registro-nacional-de-la-papa-nativa-peruana> (last accessed 2 June 2014).


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