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'That plant is my ancestor'. The significance of intellectual property on food security in developing countries

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Abstract

The global significance of intellectual property laws is familiar to most of those interested in this area of law. What might be less familiar is the impact of intellectual property on the issue of food security in developing countries. This paper considers the consequences of factors such as TRIPS-plus compliance imposed on recent entrants to the World Trade Organisation, the role of UPOV and the impact of protecting plant breeders' rights on food security in developing countries. In particular the paper focusses on examples drawn from the Pacific where island countries are not only considering WTO membership or have recently signed up to this and incurred consequent IP obligations, but where food security is increasingly under pressure due to climate change, environmental degradation, loss of biodiversity, shifts in agricultural practice and knowledge transfer, changing socio-economic patterns and the consequences of the global economic crisis. This is also a region where Western models of IP, although prevalent as introduced and imposed concepts, fit uneasily with forms and practices of indigenous traditional knowledge and practice which may be better suited to ensuring sustainability of food crops than the present thrust of IP laws.

Introduction

Pacific Island countries are examples of developing or least developed states. They are also the focus of much of my research. However my title is drawn from one of the more developed Pacific island countries: Hawaii. The University of Hawaii embarked on research to develop genetically modified species of the staple Pacific food crop: taro. This starchy root is a widely consumed food in the Pacific region. It is also subject to taro-blight which has seen taro crops in many island countries such as Samoa and Solomon Islands wiped out, with consequential negative impacts on exports and home consumption. The development of a blight-resistant species would bring considerable benefits to the Pacific region. However, it is also a plant which is significant in stories of origin the Pacific and is of considerable cultural significance in many Pacific island countries: it is not just a food.¹ In Hawaii, tradition holds that 'In Hawaiian mythology, the gods Wakea and Ho'ohokukalani's first child, Haloanakalaukapalili, was stillborn. When he was buried in the ground, he became the first taro plant ... The couple's next child, Haloa, was the founder of the Hawaiian people, according to the legend.'²

As a result of research into hybrid taro varieties during the 1990s the University of Hawaii patented three of these in 2002.³ Four years later the University relinquished all claims to

¹ See FAO, Taro Cultivation in Asia and the Pacific, <http://www.fao.org/docrep/005/ac450e/ac450e08.htm#b5-6.5%20Taro%20Cultivation%20in%20Vanuatu>

² Stated by Nalei Kahakalau, reported in *Honolulu Star Bulletin* May 25, 2005 <http://archives.starbulletin.com/2005/05/25/news/story4.html>.

³ The fact that the hybridization itself built on generations of Hawaiian traditional knowledge in breeding and hybridising taro varieties, did not stop the university filing US patents. Indeed it appears that there is minimal state control of bio-prospecting despite constitutional safeguards to 'protect all rights, customarily and traditionally exercised for subsistence,

rights and royalties, or ownership on patents from the three varieties of hybridised taro which had been developed, in 2006.⁴ Why? Because protestors called for a ten year moratorium on all genetic crop research in respect of taro for ten years.⁵ Although the opposition failed to secure national legislation banning such research, local legislation was successfully passed in Maui county by the Maui County Council in 2009, which ‘prohibits anyone from testing, propagating, growing or introducing genetically engineered or modified taro, . . . , within Maui County’.⁶ Three factors seem to have played a key role in informing the opposition, the first was some misunderstanding about the nature of the research being undertaken, the second was fear that GM taro would cross-breed with Hawaiian native taro and thereby contaminate or mutate the native taro, the third and overriding concern which was the cultural association with taro by native Hawaiians as a plant of origin. It was suggested that claiming ownership or interfering with this genealogical connection was inconceivable because this would be akin to claiming ownership of a family member and thereby subjecting them to slavery, or mutating an ancestor.

The Hawaii example illustrates a number of points. First, where staple food crops are jeopardised by disease or other threats such as climate change, GM research may provide a solution. Secondly, that research was itself drawing on generations of taro cultivation, biodiversity and hybridisation of food crops by indigenous people, in other words manifestations of traditional knowledge. The results, however, would be protected through patents, which, had there been no opposition, would have secured ownership and royalties for the research institute and with no distribution of benefits to those who had nurtured that biodiversity, and added to the expense of dissemination of the product to those countries which suffered most severely from taro blight (for example, Samoa, Solomon Islands and Fiji). Thirdly, the opposition to the research demonstrated that not all people see intellectual property law in the same way.

Indeed intellectual property regimes driven by western liberal economic considerations may be totally unsuitable transplants for societies where there is a culture of sharing resources and advocating communal rather than individual division of benefits. This paper proposes to consider the relationship between trade, IP laws and food security using the example of Pacific island states to illustrate the disjuncture between traditional forms of management of ‘intellectual property’ and those advocated under western-framed models, and the consequences that may flow from the imposition of the latter and the denial of the former when it comes to ensuring future food security for those who may be most vulnerable.

Problems with Western IP models

Western-centric models dominate global discourses of intellectual property and are part of the baggage that developing countries encounter both as a result of colonial legacies and in their attempts to engage in the global economy. This is as true of the Pacific island states as elsewhere in the developing world. IP lawyers will be familiar with the normative

cultural and religious purposes’ possessed by native Hawaiians – G. Schlais, ‘Patenting of Sacred Biological Resources, the Taro Patent Controversy in Hawaii: A soft law proposal’ (2006-2007) 29 *U.Haw.L.Rev* 581-618, 607.

⁴ ‘Hawaiian Taro Patent discussions’ <http://manoa.hawaii.edu/overge/taro.html>

⁵ GMO research has a long history in Hawaii and the earliest GM papaya was developed and successfully marketed to the USA in the 1990s.

⁶ M. Tauji ‘Maui council OKs ban on GMO taro’ *Honolulu Advertiser* 3 October 2009 <http://the.honoluluadvertiser.com/article/2009/Oct/03/br/hawaii91003001.html>

underpinnings of western IP law (conferment of individual rights, exclusiveness, recognition and fixing of origin, incentivisation for creativity and protection of output, all largely directed at securing the commercialisation of intellectual effort).

For the most part in developing countries which are well behind the ‘technological frontier’ these forms are IP laws are irrelevant to the subject matter which they might be assumed to cover. These are countries of oral tradition, not written records; of cultural heritage protected by secrecy, taboos, and social controls. They are not countries, in which there is industrial creativity, manufacturing inventions or research institutions exploiting the rich bio-diversity and traditional knowledge of the region. The origins of much that might be regarded as cultural heritage – songs, dance, costume, stories, medicinal knowledge has no fixed point in time and may be attributed to non-human sources as much as human. For example, it has been observed:

if a man, or more rarely a woman, gives his name to a new taro that he or she has discovered in a fallow pond, his descendants will conserve it as part of their heritage. In Vanuatu, there are not so much property rights but usufruct rights. An individual owns what he plants and not the soil that nourishes the crops. The new taro holds the seal of its discoverer. The farmer will plant it, multiply it and distribute it with attention as his ‘invention,’ as the range of its dispersion will be the measure of his renown while alive and after his death.⁷

Similarly in writing about the transmission of music, Stern has explained:

There is a close connection between spirit entities and composition. Most of the time, people believe that a song or dance was brought to the living by the ancestors' spirits in dreams while asleep or walking alone in the bush. The composer plays the role of ‘receiver’ of songs ...⁸ or of mediator between the spirits and humans Indeed, if a person appropriates a form of oral expression without having given something in exchange, that person would be exposed to sickness or even death caused by the spirits' harmful action. A song, the rights to which have been given, may sometimes tell the story of the family behind it.⁹

And in the case of a dance costume it has been explained that

Designs on the back of the skirt place them where they are visible, where the eye is drawn to the swaying and flowing motion of the dancing women, and the image of rushing/falling/opening water or feathers, light, or land in particular places. Designs are events; they are places. They arise there, as do spirit songs ...or specific taro varieties; like people themselves in fact, whose distinctiveness and visibility is made through their constitution in relation to taro, spirit, landform, and myth. In this way,

⁷ S. Caillon and V. Lanouguère-Bruneau, ‘Taro diversity in a village of Vanua Lava island (Vanuatu): Where, What, Who, How and Why?’ (2004) Third Taro Symposium, Nadi, Fiji, 22-24, 8.

⁸ Ammann, Raymond, 2008, “ Chants de pouvoir au Vanuatu ”, *Cahiers d’Ethnomusicologie*, n°21, 117-134.

⁹ Monika Stern ‘Music in Traditional Exchanges in North Vanuatu’ (2013) *Pacific Studies* (forthcoming).

design and place are mutually constitutive, adding ... skirts to the other elements of bodies that are all drawn from the particularity of named places.¹⁰

The relationship of IP and Food Security

The example from Hawaii gives some indication of the link between food security and intellectual property. In developing countries many people are dependent on the food they can grow or harvest from natural resources. Per capita income is low and prices of manufactured goods including fuel and food considerably higher than in some developed countries especially in those goods have to be imported. Most of the countries of the south Pacific region (with the exception of Australia and New Zealand) are among the world's least developed countries (LDCs) and many are also categorised as small island developing states (SIDS).

As the the UN-Office of the High Representative of Landlocked and Least Developed States has pointed out:

SIDS tend to confront similar constraints in their sustainable development efforts, such as a narrow resource base depriving them of the benefits of economies of scale; small domestic markets and heavy dependence on a few external and remote markets; high costs for energy, infrastructure, transportation, communication and servicing; long distances from export markets and import resources; low and irregular international traffic volumes; little resilience to natural disasters; growing populations; high volatility of economic growth; limited opportunities for the private sector and a proportionately large reliance of their economies on their public sector; and fragile natural environments.¹¹

There is therefore, not only vulnerability to natural disasters (tsunamis, earthquakes and cyclones) but many of these islands are increasingly threatened by the adverse effects of climate change. As acknowledged by the UNFAO in a briefing paper on Climate Change and Food Security in the Pacific (2009): 'Despite the fact that PICTs make negligible contributions to global greenhouse gas emissions rates (0.03 per cent), they find themselves – unfairly – facing the frontline of climate change impacts. Climate change seriously threatens ongoing regional development and the very existence of some low-lying atoll nations in the Pacific'.¹²

Climate change is only one factor however. Others include rapid population growth in some parts of the Pacific, or rapid population decline in others, resulting either in land pressure or land abandonment. Changing life styles including change of diet, unregulated exploitation of natural resources and over reliance on a narrow range of exports are also relevant. At the first Food Summit to be held in the region in 2010, it was recognised and agreed that

¹⁰ James Leach 2003, *Creative land. Place and procreation on the Rai coast of Papua New Guinea*, Oxford Berghan Books, 170.

¹¹ <http://www.unohrlls.org/en/sids/43/>

¹² FAO/SPREP/USP Climate Change and Food Security in the Pacific' Policy Brief November 2009, 5. <ftp://ftp.fao.org/docrep/fao/012/i1262e/i1262e00.pdf> (last accessed 23/02/13).

In the Pacific . . . food security is being threatened by declines in traditional crop production, increased dependence on imported foods, growing vulnerability to climate change, overfishing and illegal fishing, volatility in international commodity prices, and failure to enact and enforce food safety and quality standards. Collectively, these and other threats hinder productivity, trade and development and contribute to greater risk of chronic diseases (such as type 2 diabetes and hypertension), vitamin and mineral deficiencies, child malnutrition and food-related diseases.¹³

In combination these factors make Pacific Island countries and others like them, heavily dependent on aid from non-state parties such as the World Bank, OXFAM, the IMF and so on or from developed states either individually, for example, Australia or New Zealand, or collectively, for example, through the European Union. Increasingly aid is linked to developing trade capacity. This in turn is seen (at least from the perspective of developed states) as being facilitated through trade treaties and membership of regional and international trade organisations, the biggest of which is obviously the World Trade Organisation. Six Pacific states are members of the WTO, the most recent to join being Samoa and Vanuatu. A prerequisite of membership is TRIPS compliant domestic legislation in respect of intellectual property. Integral to the required IP laws are approved regimes for the patenting of micro-organisms and some form of plant variety protection. This may be patent law,¹⁴ or allows ‘an effective *sui generis* system or by any combination thereof.’¹⁵ The majority of developed countries have adopted an international convention known as UPOV¹⁶ as being the most appropriate *sui generis* system for securing the interests of industrial plant breeders and promoting uniformity in agriculture.

Although a *sui generis* framework itself, UPOV is a TRIPS Plus requirement, but may be mandated by WTO accession negotiations especially where the bargaining power of applicant states is weak.¹⁷ UPOV protects the rights of plant breeders provided they develop plant varieties which are new, distinct, uniform and stable (article 5 (1)). These criteria are not as stringent as for patents, making it easier for commercial plant breeders to secure monopolies. However, the requirements for stability and uniformity operate to exclude varieties developed by farmers which tend to be variable and not uniform. So to return to the Hawaii example, the University of Hawaii could patent its hybrid cultivars, but the generations of Hawaiian farmers and other Pacific islanders who had cultivated different strains of taro over the centuries would be hard pushed to do so. Similarly, plants protected by patents or UPOV

¹³ *Meeting Report of the Pacific Food Summit* (WPDHP1002530-E

Report Series Number: RS/2010/GE/22(VAN)), 1.

<http://www.wpro.who.int/internet/resources.ashx/NUT/Pacific+Food+Summit+Report.pdf>

¹⁴ Either by itself or in conjunction with other legislation, see e.g. New Zealand where the Plant Variety Rights Act 1987 is used alongside the Patents Act 1953, and the United States of America where the Plant Variety Protection Act 1970, Plant Patents Act 1930 and utility patents are used.

¹⁵ Article 27.3(b) TRIPS.

¹⁶ The acronym stands for the French title of the convention and the organising body behind it: Union internationale pour la protection des obtentions végétales. Although no Pacific island countries are listed as members as at 5 December 2012, trade partners Australia, New Zealand and the European Union are members.

<http://upov.int/export/sites/upov/members/en/pdf/pub423.pdf> (23/03/2013)

¹⁷ As occurred with Vanuatu’s accession. See the WTO package, available at <http://vanuatu-wto.blogspot.com.au/>

rights, cannot be freely exchanged or traded.¹⁸ The significance of this is illustrated by the comments of a human geographer who observed of agricultural practices in Vanuatu:

there has certainly been a huge amount of sharing and circulation taking place. This is particularly apparent with high yielding cultivars of yams which bear names such as 'tumas' (or the island of their origin ...) and are cultivated throughout the archipelago. While some of this dissemination may occur through markets and traditional exchange, one can only assume that there is also a lot of voluntary sharing of planting material going on (probably through wantok and tambu networks, ... also through other relationships and encounters).¹⁹

As was pointed out by the UN Special Rapporteur on the Right to Food in 2009,

The expansion of intellectual property rights can constitute an obstacle to the adoption of policies that encourage the maintenance of agro-biodiversity and reliance on farmers' varieties. Intellectual property rights reward and encourage standardization and homogeneity, when what should be rewarded is agro-biodiversity, particularly in the face of the emerging threat of climate change.²⁰

The problem is that developing countries, especially if they are also LDCs and SIDs are in weak negotiating positions, and western-centric intellectual property laws have very little scope for integrating traditional knowledge or indigenous culture when it comes to plant varieties. The problems of applying non-contextual IP laws are evident in an example which arose in the region.

In 1993 most of Samoa's taro was wiped out by taro leaf blight. This had adverse impacts on the domestic and export market for taro. In 1996 a regional initiative was commenced to conserve plant genetic resources.²¹ Part of this was to establish a taro breeding programme, involving a number of partners: the Agricultural School at the University of the South Pacific (USP), based in Samoa, the regional Organisation, the Secretariat of the Pacific Community (SPC), based in New Caledonia, the Samoan Ministry of Natural Resources and the Environment (MNRE), and Samoan farmers. SPC, through its Centre for Pacific Crops and Trees (CePaCT), supplied taro germplasm, lines of which came from Palau, the Philippines, Niue and South-East Asia and some funding. USP was mostly responsible for breeding and producing seedlings of new varieties, while technical assistance was provided by Australia. The Samoan MNRE and farmers were responsible for raising the seedlings and assisting with the evaluation and selection. The programme was funded primarily through regional and donor funds. There were no legal agreements or even any MOUs concerning the programme.

¹⁸ Article 15 of the 1991 UPOV Convention allows nations to restrict breeders' rights "in order to permit farmers to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting (. . .) the protected variety." This does not however, allow sharing or exchange of the propagating material.

¹⁹ Forsyth and Farran 'Intellectual Property and Food Security in Least Developed Countries' (2013) *Third World Quarterly* (forthcoming), and M. Allen, (2001) 'Subsistence or cash-cropping? Food security on Malo Island, Vanuatu' in Bourke et al, above n 63, 892.

²⁰ Special Rapporteur (A/64/170), 14.

²¹ M. Taylor, 'New Regional Genebank in Fiji was made-to-Order for Pacific Island Nations' 16(4) (2000) *Bio Science* 19-21, 19.

There are however disputes about who has the right to benefit from the new blight-resistant varieties that have been produced.

The breeders and those at CePaCT hold the view that the programme is a regional one, and should therefore benefit everyone in the region. On the other hand, some government officials in agriculture departments in both Samoa and Fiji have stressed that where economic interests are involved then national ownership of plant varieties should be considered. In particular there was concern that one country should not benefit at another's expense and effort (in this case Fiji had taken over the taro market lost by Samoa due to the blight). In other words national interests should be protected before regional ones.

The Samoan farmers who had nurtured the crops had a different view. Where particular strains and crops had proved to be especially successful individual farmers and/or villages were claiming them as their own. For example, in one village the farmers found that a particular new taro variety grew very well and gave them a competitive market advantage. The village therefore put a ban on the distribution of the genetic material, only allowing it to be distributed within the village and refusing to give the plants back to the MNRE when they came to get it back to redistribute.²² However, as the MNRE had back-up materials they were able to access the genetic materials anyway and so the ban has been lifted. Now the MNRE buys it back from the farmers and redistributes it to other farmers so they can benefit. The farmers argue that their work in raising, evaluating and selecting varieties means that they should get some benefits from them.

This case study demonstrates that there are clear tensions between regulation of plant varieties for food security and for commercial opportunities and trade. The former objectives require an environment where the best genetic resources are freely shared, whilst the latter encourage countries to utilise their genetic resources for their own benefit to gain commercial advantage over the others and also promotes nationalism over regionalism. While at present there are relatively few areas where the Pacific Island countries compete with each other for export opportunities, this has the potential to change under the influence of an increasing number of trade agreements being linked to aid.

Are there solutions?

In some parts of the developing world there had been resistance to UPOV either by using the public interest exception to exclude basic food crops or by promoting locally sympathetic *sui generis* legislation.²³ In Africa, for example, member countries of the African Union adopted the African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources in 2000. This recognises the collective rights of communities, and their customary law, whether it is written down or not and it makes plant breeders' rights subject to

²² This was possible because village councils (fono) have considerable power to regulate village life and this power derives not only from custom but from statute: the Village Fono Act 1990.

²³ For examples of countries with *sui generis* laws see GRAIN <http://www.grain.org/article/entries/14-beyond-upov>; the International Institute for Environment and Development (iied) *Biocultural Heritage* <http://biocultural.iied.org/>. On the possible alternatives see L. Helfer 'Intellectual Property rights in Plant Varieties' (FAO, Rome, 2004) <http://www.fao.org/docrep/007/y5714e/y5714e04.htm#bm4.5.1>.

recognition of farmers' rights.²⁴ Another example is the Protection of Plant Varieties and Farmers Rights Act, introduced by India in 2001. Although this is partially UPOV based in respect of plant breeders' rights, it departs from UPOV by given farmers rights similar to those of commercial plant breeders.²⁵ Under the legislation, farmers are able to protect traditional knowledge and continue with traditional farming practices such as the exchange of plants and seeds and the retention of seeds and plants for replanting. Emphasis is placed on traditional farming practices in order to protect biodiversity and use is made of traditional social organisation in the allocation of resources. Benefit sharing, community rights and public funding of research which contributes to a common pool of genetic resources fund are directed at enhancing farmers' rights.²⁶

There is also some scope for playing off international instruments against each other. For example the Convention on Biodiversity (CBD),²⁷ is aimed at promoting biodiversity thorough conservation, sharing and sustainable use. It imposes obligations on member states to 'respect, preserve and maintain the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles' and specifies that intellectual property rights should not undermine the working of the Convention (Article 16).²⁸ The Convention also recognises the pivotal role played by indigenous knowledge in global environmental sustainability.²⁹ The CBD is now strengthened by the 2010 Nagoya Protocol which establishes a set of rules to promote the fair and equitable sharing of benefits derived from the exploitation and commercialisation of biodiversity.³⁰ However, the uncertain relationship between TRIPS and the CBD has been highlighted,³¹ and doubts cast upon the CBD's effectiveness. For example, the Special Rapporteur on the Right to Food has stated

²⁴ A copy of the law can be found at <http://www.farmersrights.org/pdf/africa/AU/AU-model%20law00.pdf>. See also: N. Zerbe 'Biodiversity, ownership and indigenous knowledge: Exploring legal frameworks for community farmers, and intellectual property rights in Africa' (2005) 53 *Ecological Economics* 493; P. Cullet 'Plant Variety Protection in Africa: towards compliance with the TRIPS Agreement' (2001) 45(1) *Journal of African Law* 97; A. Mushita and C. Thompson 'Agricultural biodiversity: African Alternatives to a 'green revolution' (2008) 51 *Development* 488.; D. Collier 'Access to and control over plant genetic resources for Food and Agriculture in south and southern Africa: how many wrongs before a right?' (2006) 7(2) *Minn. J.L. Sci and Tech.* 529.

²⁵ P. Cullett and R. Koluru 'Plant Variety Protection and Farmers' rights: towards a broader understanding' (2002) 24 *Delhi Law Review* 41 <http://www.ielrc.org/content/a0304.pdf>.

²⁶ S. Ragavan, J. O'Shields 'Has India Addressed its Farmers' Woes? A Story of Plant Protection Issues' (2007-2008) 20 *Geo. Int'l Envtl.L.Rev* 97.

²⁷ This was agreed at the Rio Earth Summit in 1992,

²⁸ Cook Islands, Fiji Islands, Kiribati, Federated States of Micronesia, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu are Parties to the CBD.

²⁹ See e.g. Article 8(j).

³⁰ The Nagoya Protocol (Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity) opened for signature by Parties to the CBD on 2 February 2011 and remains open until 1 February 2012. At the time of writing (January 2012) there are 74 signatory states, fifty are required for the Protocol to come into effect. In the Pacific, Palau and Vanuatu have signed it as has the EU and France, but not Australia or New Zealand.

³¹ See e.g. GRAIN, *TRIPS versus CBD*, (1998) Issue 1, <http://www.grain.org/article/entries/20-trips-versus-cbd>.

“benefit-sharing as conceived under the Convention has failed: in spite of the existence of a number of laws in developing countries which foresee forms of direct benefit-sharing between the “owners” and “buyers” of genetic resources . . . so far there have been no examples of direct benefit-sharing between providers and recipients of plant genetic resources for food and agriculture.”³² CBD enforcement is also ‘soft’ compared to that of the WTO.

The FAO’s 2001 International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA) is also directed at benefit sharing, conservation and sustainability.³³ This treaty recognises the contribution of farmers and farming practices over generations to the world’s plant genetic resources, especially those in the developing world³⁴ but does not specify the nature of farmers’ rights. It does seem however that these include the rights of farmers to save, use, exchange and sell farm-saved seeds and other plant materials for propagation, and to share equitably in benefits derived from PGRs and to participate in decision-making affecting these.

Ideally it might be recognised in the global arena that some intellectual property should belong to the global commons as a consequence of equitable distribution of responsibility for things like global warming, and that one way of achieving equitable restitution would be to use the technological superiority of developed countries to support those who are well behind the technological frontier especially in the context of those basic resources which are necessary for life: food and water within the framework of agreed global commons. At present however, with perhaps the exception of humanitarian aid for disasters, the close affinity between aid and trade, leads round to the same problematic circle and intellectual property laws are an integral part of this.

³² O. De Schutter, *Right to Food*, UN Report A/64/170 (23 July 2009) , 17.

³³ Initially a non-binding International Undertaking on Plant and Genetic Resources agreed in 1983, advocated the sharing of plant genetic material as the ‘heritage of mankind’ and sought to ensure that farmers and informal generators of PGR were appropriately rewarded.

³⁴ C. Oguamanam ‘Intellectual property rights in plant genetic resources: farmers’ rights and food security of indigenous and local communities’ (2006) 11 *Drake Journal of Agricultural Law* 277, 287-292.