TRIPS with everything?

Intellectual property and the farming world

The fifth report published by the FEC

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FOOD ETHICS COUNCIL

THE INDEPENDENT COUNCIL FOR ETHICAL STANDARDS IN FOOD AND AGRICULTURE

The Food Ethics Council

Our aims are to:

- Review developments in food and agriculture within a sound framework of practical ethics which addresses the principles of wellbeing, autonomy and justice with respect to consumers, producers, farm animals and the living environment.
- Promote the incorporation of ethical thinking in decision-making in agriculture, food manufacturing and retailing
- Produce authoritative, well-researched reports, which highlight ethical concerns and make recommendations for action.

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Contents

Acronyms

ABS	Access and Benefit Sharing
CBD	Convention on Biological Diversity
CGIAR	Consultative Group on International Agricultural Research
CIPR	Commission on Intellectual Property Rights
COP	Conference of the Parties (CBD)
DFID	Department for International Development
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FDI	Foreign Direct Investment
GATT	General Agreement on Tariffs and Trade
GFAR	Global Forum on Agricultural Research
GI	Geographical Indication
GM	Genetically Modified
GMO	Genetically Modified Organism
GURTS	Genetic Use Restriction Technologies
IARC	International Agricultural Research Centre
IGC	Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (WIPO)
IMPs	Intellectually-based Monopoly Privileges
IPGRI	International Plant Genetic Resources Institute
IPP	Intellectual Property Protection
IP	Intellectual Property
IPRs	Intellectual Property Rights
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
LMO	Living Modified Organism (CBD)
MAT	Mutually Agreed Terms
MTA	Material Transfer Agreement
NARS	National Agricultural Research System
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
OAU	Organisation of African Unity
PBRs	Plant Breeders' Rights (UPOV)
PGRFA	Plant Genetic Resources for Food and Agriculture
PVP	Plant Variety Protection
R&D	Research and Development
TK	Traditional and indigenous knowledge
TRIPS	Trade-Related Aspects of Intellectual Property Rights (WTO)
UNCTAD	United Nations Conference on Trade and Development
UPOV	Union Internationale pour la Protection des Obtentions Végétale [International Union for the Protection of New Varieties of Plants]
WIPO	World Intellectual Property Organisation
WTO	World Trade Organisation

Summary and recommendations

Since the establishment of the World Trade Organisation (WTO) in 1995, a set of essentially global, but relatively esoteric and obscure, legal rules on patents, plant variety protection and other forms of 'intellectual property' are affecting the future of food and farming, especially for people in low- and middle-income countries. The Food Ethics Council believes that more widespread understanding of the nature and effects of these rules on our food future is needed. A growing number of bodies are becoming concerned about these issues and the UK Government's Commission on Intellectual Property Rights reported on its wide-ranging conclusions on intellectual property and development just as we were finishing this report.

Our aim is to encourage wider discussion of these rules in the UK and our report focuses on innovation aimed at farming and its possible impact on people in low- and middle-income countries. They have the most urgent needs and are also custodians of the crucial agricultural biodiversity upon which we all depend for our long-term food security. We have concerns about the way the rules were arrived at and are being implemented and extended, the possible adverse consequences they may have for the food security of the poorest people on earth, and the nature of the rules themselves.

Our report briefly outlines some general issues arising in intellectual property before discussing the international agreements that affect us, in particular the Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS) in WTO. Owing to its complexity and the range of other institutions involved we provide greater details in Annex 1. We highlight our specific recommendations in bold within the various chapters and make more general recommendations in the final chapter.

We try to draw out the ethical issues concerning notions of freedom, fairness, utility, intergenerational justice, respect for intrinsic value, and agricultural biodiversity. We look at issues arising for farming from four angles – those of inventors and innovation, farmers, citizens and agricultural biodiversity.

We find that there are considerable ethical concerns arising from these issues. In particular:

• the process of rule-making on IP is unbalanced and unfair. The very wide range of people affected by the rules and regulations of the WTO on intellectual property were not involved in their making; in the main, they were determined in the private interests of a few, in a manner not open and transparent.

• the impact of such rules is potentially detrimental, not only for public good agricultural research and development (R&D) and agricultural biodiversity but could prove to be counter-productive, indeed disadvantageous for smallholder farmers and many people in low- and middle-income countries.

• there appears little justification for these rules to be applied to agriculture in a global way. The major beneficiaries appear to be a few industries and governments of industrialised countries anxious to foster, develop and control the use of modern biotechnology for national economic advantage.

We recommend that:

• in general, the language used in these debates should be changed to more accurately reflect the reality of the instruments created – shifting from 'rights' to 'privileges' and from 'property' to 'monopoly'. Hence we suggest use of the term 'intellectually-based monopoly privileges (IMPs)' rather than intellectual property rights (IPRs) to give greater emphasis to the social basis on which they are granted, the reality of what they do and the balance that needs to be achieved in their design and application.

• the rule making process is made more just and equitable
  - by expressly including smallholder farmers, poor consumer and traditional and indigenous communities in shaping policies nationally and internationally, to make the whole process more representative of their interests.
  - by strengthening the capacity of low- and middle-income countries to negotiate on these issues and develop appropriate legislation.

• IP rules be balanced by introducing and enforcing the necessary anti-trust and liability rules and other international agreements on biodiversity and plant genetic resources for food and agriculture.

• special and differential treatment should apply to food and farming in low- and middle-income countries with the existing rules being modified to differentiate between the needs of different sectors and countries in agriculture, so that, for example:
  - patent terms may be varied according to the subject matter and level of economic development.
  - the exclusionary element of patents, plant variety protection and other forms of IP is rethought for processes and products of importance to food production, with a view to providing a right to reward for use, if necessary, but denying the right to exclude others from using processes, products and knowledge necessary for food security.
  - broad patents on research tools and processes and copyright restrictions on basic information should be avoided.

• a major rethink commence on the nature of research and development, the appropriate links between them and the way IP and other rules affect the direction of research. Aim to keep basic research knowledge open, transparent and freely shared, and separate it from the development of products by private interests in a competitive market environment.

• a food system-wide study of the uses and role of IPP and its effects on the system's operation, functioning and market structures, of how the rules on IPP affect the shape of R&D and are used in influencing consumer habits.

• recognition be given to the intrinsic value of agricultural biodiversity and mechanisms be developed to maintain and develop this in all countries.

• all governments sign and implement a binding, effective verification protocol to the Biological and Toxin Weapons Convention.

1. Introduction

Various forms of intellectual property (IP), in particular patents and plant breeders rights, increasingly influence what food and feed is grown and sold around the world. Some forms of IP are used to help shape our eating habits while others underpin many controversial developments in modern biotechnology, especially genetic engineering. Yet unlike food, farming or even new developments in biotechnology, few of us in Britain know much about them.

We meet IP as consumers, for example, when we respond to adverts that encourage our children to want to eat certain food products or in places that are branded. Brands are trademarks, a form of IP, that can provide some guarantee about the nature of the product or service on offer but can also be, when linked to advertising and marketing, a powerful influence on what we buy. If they buy a rose or other ornamental plant from a garden centre, gardeners may find a note attached saying they are not allowed to take cuttings or otherwise propagate the plants they buy. The same may be the case for vegetable growers, with restrictions placed on their saving seed. This is possible because the holders of another form of IP, in this case plant breeders' rights (PBRs), can legally exclude people from doing things they might otherwise have done, like replant seed.

"'Intellectual property' is a twentieth-century generic term used to refer to a group of legal regimes which began their existence independently of each other and at different times in different places"[1] These different forms provide creators and inventors with legal protection from someone copying or using their work or invention without permission. Some protect the intellectual knowledge behind technological innovations (patents) and others protect creative works such as books, films and music (copyright). They also include trademarks such as those connected with branded goods, geographical indications like Stilton cheese and champagne, and trade secrets such as the formula for Coca Cola. These different forms of IP are an invented kind of intangible property – yet just as valuable as oil, gold or land for some. Societies construct the rules governing them through political processes dependent on power plays for their outcomes[2]. They are not like a natural phenomenon such as gravity waiting to be discovered. In today's knowledge-based market economy, control of so-called 'intellectual property rights' (IPRs) helps in controlling markets, and influences the distribution of wealth and power.

This fifth report of the Food Ethics Council begins to explore the impact of intellectual property on that essential commodity for all – food. Ideally, this report should be read alongside our earlier reports – Novel Foods: Beyond Nuffield (1999) and Farming Animals for Food (2001) - since the IP regime is closely linked to the way new technology is being developed. Those reports principally addressed the ethical issues arising from the growth of new technologies themselves.

Here we focus on the less visible but no less important rules that help decide what technologies are developed, how and who gets what out of innovations. We try to draw out the ethical issues concerning notions of freedom, fairness, utility, intergenerational justice, respect for intrinsic value, and biodiversity. The analysis is informed by the framework called the ethical matrix used in our previous reports. This report has a global focus on IP rules, and pays particular attention to their implications for farming in low- and middle-income countries. This is because the creation of the World Trade Organisation, which includes an Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS), has led to the most rapid extension of IP rules in history and often into agriculture for the first time in many of these countries.

Historically, IP rules have been a matter of national decision-making based on national economic development needs. Individual states pursued their national interest with international treaties usually originating in Europe and the United States and which were then adopted by interested states. Countries copied technologies from each other, selectively offered patent rights, for example, to domestic inventors over foreign nationals, or simply did not allow any patents on some products such as medicines. Some did not fully adopt the international rules. For example, until the mid-1980s the USA protected the domestic printing industry by denying copyright to foreign authors unless their books were printed domestically. Today, patents still must be applied for in each country, although there are mechanisms to enable companies to apply for them in many countries at a time through the World Intellectual Property Organisation (WIPO). WIPO was the place where international discussion and negotiations about IP was held – until TRIPS. Under WIPO countries were free to sign up to each of the various agreements individually – and that was the problem for those industries and countries that wanted a global IP regime in their economic interests.

By introducing IP rules into the WTO and making them subject to its binding disputes procedure, as we discuss in more detail in section 3, proponents of a strong IP regime have made it possible for non-compliant WTO Members to face trade sanctions in any area if they fail to live up to its rules. This is arguably the main reason why IP was introduced into the WTO, where it stands alongside goods and services (Figure 1), instead of WIPO. The other inter-

[1]Drahos P (1996) A Philosophy of Intellectual Property. Aldershot: Dartmouth, p 14

[2]May C (2000) A Global Political Economy of Intellectual Property Rights – The New Enclosures? Routledge: London

national agreements affecting IP and agriculture require states to do considerable work to turn their commitments into rules and regulations. They have no enforcement mechanism and produce 'soft' law rather than the 'hard' law of TRIPS.

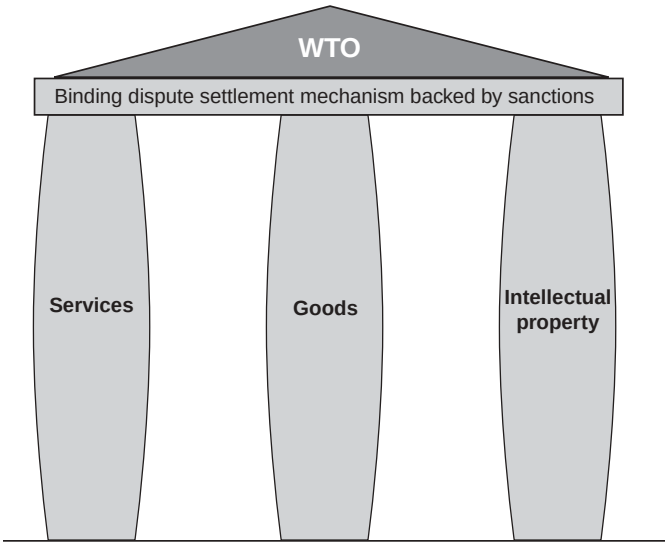
The strengthening and extension of the IP regime has led to a range of concerns about its impact on low- and middle-income countries, especially concerning its effects on health – from access to AIDS drugs in Africa to basic diagnostic techniques for screening for breast cancer[3]. Similar concerns are being raised about food by a range of academics and development agencies such as Action Aid and Oxfam. These include its effects on who does what research and development, how and whether smallholder farmers can continue farming, especially in low- and middle-income countries, and the increasing concentration of power in the various sectors of the food system. Others concern the way in which these rules were agreed and extended globally and the continued pressures for countries to adopt ever higher standards of protection. A central issue is whether the new IP regime strikes the right balance of interests between those affected by it, and whether it is embedded in a broader regime that can curb the tendency to monopoly and abuse that IP can give rise to (such as cartels).

The UK government recognised the complexities and concerns about IP in its White Paper on International Development in 2000 and set up a Commission on Intellectual Property Rights (CIPR) to consider "how intellectual property rules might need to develop in the future to take greater account of the interests of developing countries and poor people"[4]. The Commission reported to the Secretary of State for International Development in the Department for International Development (DFID) in September 2002 just as we were completing our report[5]. We hope our report will contribute to a broader discussion of these issues in Britain and to the follow-up that takes place on the food and farming side of CIPR's report.

Concerns about the impact of IP in food are part of a larger concern about how the current IP regime affects society. The proponents of a strong IP regime globally argue that it provides the necessary incentive, proper reward and required security for investment in research and development (R&D) to produce life-improving innovations. James Boyle, professor of law at Duke Law School argues that the effects will be widespread and not as beneficial as the proponents suggest. He helped draft the Bellagio Declaration which argued that: "The blandishments of the international information industries notwithstanding, more intellectual property rights may actually mean less innovation, less heterogeneity in culture and environment and a less informed world of public debate."[6] IPRs, he argues, are being used as part of a new round of enclosures in what were formerly the 'global commons' – including genetic information encoded in the genes of people, plants, animals and microorganisms[7].

Others see stronger, global, IPRs resulting in a new form of "feudalism". This is because they will alter social relations in ways that mean individuals never 'own' entities like software or seeds. Instead purchasers are only licensed by their corporate rights holders to use them in very limited ways and are excluded from socially important acts normally associated with real property – the ability to lend, share, give away or sell it[8]. Thus, the issues surrounding IP go far beyond food and agriculture and beyond the scope of what we can deal with in this report. We can only briefly sketch out some of the issues in this report.

Figure 1. Three pillars of the WTO



1.1 IP in the food system

The effects of the globalisation of IP rules on the nature and structure of the food system are likely to be extensive, complex and often indirect. The various forms of IP are tools used by various actors – input suppliers, traders, manufacturers/ processors, distributors and caterers rather than farmers and consumers – largely in the industrialised world's food system. This complex web connects various components including the biological, economic and political, and social and cultural [Box 1]. Within this web, the various actors are engaged in a struggle over who will have power and control over the future supplies of food, and how the benefits and risks arising from different activities will be distributed. IP affects these factors and is related to how the different actors manage their operations[9].

Of course, there are differences within any group of actors, eg between small and large farmers or corner shop and multiple retailers. These differences affect how well each can use the different forms of IP, as does the market

[3]The people vs patents and Westphal S P (2002) Your money or your life. New Scientist 13.7.02, 175 2351, p 3 and pp 29-33

[4]HMSO (2000) Eliminating World Poverty: Making Globalisation Work for the Poor. London: HMSO Cm5006 p 47

[5]CIPR (2002) Integrating Intellectual Property Rights and Development Policy. Report of the Commission on Intellectual Property Rights, London: CIPR. www.iprcommission.org

[6]Boyle J (1996) Shamans, Software & Spleens – Law and the Construction of the Information Society, Harvard Univ Press, Cambridge, Mass.: Harvard University Press p 197

[7]Boyle J (2001) The Second Enclosure Movement and the Construction of the Public Domain. Paper presented at Conference on The Public Domain, Duke University School of Law, 9-11 Nov 2001. http://www.law.duke.edu/pd

[8]Drahos P and Braithwaite J (2002) Information Feudalism – Who owns the knowledge economy. London: Earthscan

[9]Tansey G and Worsley T (1995) The Food System - A Guide. London: Earthscan

Box 1. The food system's complex web

Biological: the living processes used to produce food and their ecological sustainability.

Economic and political: our food has a history based on the interplay between these which affect the power and control which different groups exert over the different parts of the system and its shape today.

Social and cultural: our personal relations, community values and cultural traditions affect our approach to and use of food.

The various actors use whatever tools they can to control their operations and cope with the pressures they face, including:

Science and Technology - technological developments do not necessarily depend on a correct scientific understanding of why something works. However, scientific advances may underpin development of new technologies, as for example, in nuclear power and biotechnology. Patents are increasingly important here.

Information - the spread of global media, broadcasting similar images across the world, helps fuel product globalisation and reinforce brand images, usually protected by trademarks or copyright.

Management - work organisation has shifted from craft-based, small-scale production to a large-scale, mass-production phase which now often uses just-in-time manufacturing and stocking techniques. There is pressure for business methods to be patentable and they are in the USA.

Laws, Rules, and Regulations - the prevailing norms and laws governing activities in the system result from the way particular interests are able to shape the legal framework.

structure. In industrialised countries such as the UK, there is a growing economic concentration of market power, with fewer and fewer companies which control larger and larger shares of the market - from input provision to farmers to retailing to the public. The ability of those with the greatest market power to use various forms of IP is generally greater than smaller enterprises.

Food-related businesses in industrialised countries face a basic constraint – what economists call a limited demand – earlier than in other sectors. We can only eat so much. We can, in the affluent world, have two cars and three or four TVs but we cannot double or treble our food consumption for long without major health problems. Indeed, in some industrialised countries the food systems are becoming dysfunctional, and leading to populations with rising levels of obesity as the pressures increase on people to overeat. For example, in the USA the rate of adult obesity rose from 12% to 18% between 1991 and 1998[10]. These biological limits also mean businesses face pressures including:

• increased competition for the money spent on food – with brands (trademarked, IP protected) being used to help differentiate products in the market and brand advertising used to attract and retain consumers, even from a very young age

• increased use of technology to generate greater returns to investment – which may involve use of IP such as patents on products or processes for making them[11].

It also leads firms to expand into global markets and to seek ever better tools for control over their activities. For those seeking to sell into global markets there is a strong desire for sets of rules – and standards - that operate globally rather than nationally. Thus, they have a considerable and not unexpected interest in helping shape the global rules to their benefit.

1.1.1 What types of IP affect food?

Trademarks, geographical indications, and trade secrets are widely used. The use of trademarks is often linked to other tools for control such as brand advertising. Greater efforts to protect brands and increase market share are increasingly likely. In 1993, the chairman of Unilever, the Anglo-Dutch multinational, called brand equities 'the most valuable items in our stewardship' and saw ' the power of our brands as the engine of long-term growth'. During that year, the company spent almost 12 per cent of turnover (£3284m) on advertising and promotional investment. In 2000, Unilever announced plans to dispose of three quarters of its 1600 brands to focus on just 400 around the world. More recently its chairmen said "We are focused increasingly on driving the growth of our leading brands and dealing with other brands in ways which create value for shareholders" [12]

As the reach of the market, especially an increasingly globalised market, goes further into low- and middle-income countries so too will the major actors make use of various forms of IP as part of their business development strategy. In urban societies served by multiple retailers and saturated by advertising and media images, unless producers have a major brand they will not get on the retailers shelves. Normally, only the top two or three brands actually do.

For some products, a combination of widely advertised branded [trademark] products and trade secrets – Coca-Cola being the most famous – are used. Others may develop certification schemes to show that those people supplying the good have followed a particular practice, eg organic production or artisanal methods. The ability of small producers to find markets for their often unadver-

[10]Nestle M (2002) Food Politics. Berkeley, L.A.: Univ. California Press p 8

[11]OECD (1971) Food Policy. Paris: OECD

[12]Burgmans A & Fitzgerald N (2002) Unilever Annual Report

tised products is very different from those whose supply chains lead into globally promoted branded products.

For other producers, producing a product in a particular way or region under a designated name, linked to the region and method of production, provides a marketing tool that allows them to capitalise on their uniqueness. These geographical indications (another form of IP) are of considerable importance in some foods, eg Stilton and Roquefort cheeses, Parma ham. Such designation normally comes out of a well-established activity that has national recognition and produces products sought after by consumers.

These are the forms of IP we commonly come across in our shopping as consumers. But for our farmers who buy seed, fertiliser, feeds, and equipment, and for researchers developing new breeds, varieties and products for them to use, the key forms are patents and plant breeders rights. They are what will increasingly influence food production. While they have been used in the urbanised, industrialised countries for a few decades, they are still very new in many poorer, low- and middle-income countries. Here, there are concerns that exposure to the full range of IP tools being wielded by the large firms, which are sophisticated in their use, may have a major adverse impact on people's livelihoods and food security[13].

1.1.2 IP and biotechnology

Modern biotechnology provides a new set of tools for technological control of the basic inputs for farmers, the plants and animals they grow. Its development is intimately linked to the nature of the types of IP available to the developers. Patents, in particular, are closely linked to biotechnological innovation and have contributed to the development of modern biotechnology[14]. It includes a number of different areas such as:

• **Cloning** – the process of producing genetically identical individuals from a cell. This can range from taking cuttings from a plant to (as in the case of Dolly the sheep) taking a nucleus from a single animal cell and transplanting it into a recipient cell with its own nucleus removed, and the resulting cell being allowed to develop into a mature animal.

• **Genomics** – the study of the complete DNA sequence (genome) of a given organism.

• **Marker assisted breeding** – the use of DNA markers, rather than characters or traits, to speed up the process of selective breeding of plants or animals for agricultural use.

• **Genetic engineering** (recombinant DNA technology) – deliberate insertion of genes into a DNA molecule using the techniques of modern molecular biology producing so-called GMOs (genetically modified organisms).

What unites the various competing businesses developing products and processes in this area is a growing use of IP such as patents and plant breeders rights (PBRs) to protect their investments – and litigation between some to settle disputes[15]. Indeed, without these forms of IP, while research would undoubtedly go on, the way and speed with which its results were developed in the field would almost certainly be different.

Our concerns about GM were discussed in our earlier reports. Its potential to open up new market opportunities all over the world led to an expansion of private sector interest in agricultural research in developed countries. This has happened at the same time as public sector financed research and development in agriculture has declined and moved away from that of practical benefit to farmers. Instead, policy makers are favouring private sector activities in this area.

In future, the structure and properties of GM crops will be linked more closely to the interests of food processors as well as to those producing proprietary chemicals that might be used to trigger specific traits or be used without damaging the crops. Similar developments are likely with GM animals, which are already being used as living drug factories (so-called 'bioreactors'). Certain forms of IP are vital for the private-sector-led transformation of the basic inputs into agriculture – the plants and animals farmers grow. The firms involved want a set of rules and regulations to permit them to secure benefits from their R&D. If they can, companies naturally want to stop others from copying – or buyers reproducing – their new products. This can be done in two ways. One is by legal means, through IP rules where they can be enforced. The other is technologically, by breeding hybrids or by attempting to develop technologies that will stop seeds germinating or specific traits being activated without a purchased input – these are genetic use restriction technologies (GURTS) also dubbed 'terminator' and 'traitor' technologies[16].

The potential of modern biotechnology drew new players into the business of seed production, largely from the chemical and pharmaceutical industries. They have invested billions of dollars over the past two decades in agricultural biotechnology R&D and want to see returns on this investment. To do so means the crops they have developed must be grown commercially. These companies have a long history of using patents as business tools and require some form of control over their rights to both the research tools they have developed and to prevent reuse of their products, such as seeds, without their permission or further payment. They were one of the important interest groups keen to allow for patenting of living organisms and stood behind the main players pushing for changes in the IP rules internationally: ie, the pharmaceutical, recording, software and film industries[17].

[13]See, for example, Action Aid's Food Rights campaign. www.actionaid.org

[14]Barton J (2002) Intellectual Property, Biotechnology, and International Trade: Two Examples forthcoming in Intellectual Property: Trade, Competition, and Sustainable Development The World Trade Forum eds Cottier J et al. Michigan: University of Michigan Press, Vol 3

[15]Barton J (1998) The Impact of Patent Law on Plant Biotechnology Research in Intellectual Property Rights III Global Genetic Resources: Access and Property Rights'. Madison Wisconsin: Crop Science Society of America

[16]Food Ethics Council (1999) Novel Foods: Beyond Nuffield. Southwell: FEC. Section 4.4.4, p 25

[17]Drahos P (1995) Global Property Rights in Information: The Story of TRIPS at the GATT Prometheus 13 pp 6-19 and see note 8

2. IP and economic development

The ordinary concept of property itself is not a natural phenomenon but a socially constructed one. For some indigenous peoples, for example, the idea of ownership of land, a fundamental in most current ideas of tangible property, was literally 'non sense' and did not figure in their way of seeing the world. The idea of creating an intangible form of intellectual property, which developed centuries ago in Europe, is 'entirely a legal construction'[18]. In other words, it was constructed by those people with power in society. To be socially acceptable in European society, for example, the notion of intellectual property required a society secularised enough to accept that creative genius was a personal trait not a divine gift, that intellectual products had to have a commercial value in their own right and that private rights had to be distinguishable from those of sovereigns[19].

Historically, two main moral and philosophical arguments for rewarding creative and innovative people have been used. One stems from the view of the nineteenth-century German philosopher Hegel – that an idea belongs to its creator because the idea is a manifestation of the creator's personality or self. The other was advanced by John Locke, the seventeenth-century English philosopher - that the value added through labour should be rewarded with property.

Today, in practice in industrialised countries, the rationale for protecting the intangibles created by intellectual property is essentially utilitarian – with the utility focussed on promotion of innovation on the assumption this bring benefits for all. A piece of knowledge about how to make something, for example - unlike a physical object such as a piece of bread – can be used by one person without limiting its use by others. Sharing knowledge with others, then, does not reduce the amount of knowledge you have, unlike sharing a piece of bread. However, it might reduce the advantage you may have if you are the only one to know something or allowed to use what you know. The widest possible dissemination of new knowledge makes for the greatest economic efficiency. But if everybody is free to use new knowledge, inventors have little incentive to invest in producing it. The various forms of IP stop that (usually temporarily) by transforming knowledge from a shared public good into a private good. This gives the holders of IP enhanced market power and means they can recoup their expenditure in creating new knowledge to produce innovations through monopoly pricing. Creative minds and innovative firms thus have an incentive to engage in inventive activities. The IP regime, then, plays an important role in underpinning private sector led innovation, and also in the ability of firms to establish and maintain market power.

This argument provides the main rationale for the protection given by patents, copyright, plant breeders' rights and other types of IP. The various forms of intellectual property in different countries differ in terms of the subject matter that may be eligible for protection, the scope and duration of protection, and possible exemptions to exclusive rights. This reflects the fact that they are a concession granted by a society, through the laws it constructs, which advantage a specific group for broad social goals (increasing creativity and inventiveness), and try to balance the interests of producers and users of intellectual works[20].

In an extensive study reviewing the main justifications for IP – whether for reward to authors or to promote innovation - political scientist Chris May claims that their real purpose today is protecting investment. In some countries this is identified with the national interest. Indeed, the US when negotiating to put new IP rules into the WTO in TRIPS saw them as a way "to retain its competitive advantage in the global system"[21]. This is not seeing the rules as a way of encouraging the transfer of up-to-date technology but rather of maintaining the gap to ensure national advantage. However, May argues that the gap is legitimised by using IP justified on the basis "not of advantage, but of the rights of the individual knowledge innovators".

The EU clearly sees IP playing a role in helping secure its members' economic interests in the development and application of modern biotechnology[22]. The European Commission, together with the Council, was asked by the European Council in Stockholm in March 2001 to "examine measures required to utilize the full potential of biotechnology and strengthen the European biotechnology's sector's competitiveness" as a knowledge-based economy. Among the measures proposed by the European Commission in a 30-point action plan is "Creating a strong, harmonized and affordable European intellectual property protection system" as one support for this.

Drahos warns against thinking of IPRs as rights rather than as privileges: "Unlike real property law, intellectual property law posits rights in abstract objects…intellectual property rights are rule-governed privileges that regulate the ownership and exploitation of abstract objects in many fields of human activity… [they] are liberty-intruding privileges of a special kind…they promote factionalism and dangerous levels of private power. From the point of view of distributive justice, their scope should be limited…there are strong reasons for supporting private property rights, but we should do so in a contingent, consequentially-minded way…guided by a philosophically defensible view of the role of property in social life and democratic culture"[23]. Utility has a particular importance in IP since IP rules create privileges for some, purportedly for the greater social and economic welfare of all. This supposed justification, however, is open to the challenge that the costs to the poor, as opposed to the benefits to the wealthy and powerful, have not been given due consideration, which they should be in any proper consequentialist analysis.

[18]May C (2002) Presentation to Commission on Intellectual Property Rights Conference "How Intellectual Property Rights Could Work Better For Developing Countries And Poor People" 21–22 Feb 2002, London. www.iprcommission.org. Also see note 2

[19]Lesser W (1997) "The Role of Intellectual Property Rights in Biotechnology Transfer under the Convention on Biological Diversity". Ithaca, NY: ISAAA Briefs 3. www.isaaa.cornell.edu

[20]Based on: Primo Braga C A (1990) 'Guidance from Economic Theory,' in Strengthening Protection of Intellectual Property in Developing Countries: A Survey of the Literature, World Bank Discussion Paper no 112. ed Siebeck W E. Washington, DC; Primo Braga C A et al, (1999), Intellectual Property Rights and Economic Development. World Bank Discussion Paper and Downes D (1998), The 1999 WTO Review of Life Patenting Under TRIPS. Washington DC:Center for International Environmental Law. www.econet.apc.org/ciel

[21]See note 2 p 119

[22]Commission of the European Communities (2002) "Life sciences and biotechnology - a strategy for Europe" Brussels: Commission of the EC. Com (2002) 27. http://europa.eu.int/http://europa.eu.int/comm/biotechnology/pdf/policypaper_en.pdf

[23]See note 1 pp 1&5

2.1 Compromise and contention

So, in practice, the various forms of IP are "a compromise between preserving the incentive to create knowledge and the desirability of disseminating knowledge at little or no cost"[24] but getting that balance right is hard. Consequently, the effects of IP are quite contentious and disputed[25]. Moreover, a system developed for innovation in inanimate objects has been extended gradually, and recently, into living organisms, and with genetic engineering that has accelerated into a rush since 1980. For some, the whole idea of extending IP into the living world is intrinsically wrong. For others, the problems only arise should there be adverse consequences.

With patents (see box 2), for example, although they are supposed to provide benefits to their owners and society at large, in reality, "the basic patent bargain works only in theory. In practice, both sides cheat." argues Professor of Information and Organisation at Sheffield University, Stuart Macdonald[26]. "Most obviously, the patent affords protection only when the patentee can afford to enforce his rights, which may mean that the poor have no protection at all…And if society cheats in not providing the protection the inventor has a right to expect from the patent system, the inventor cheats too. Only in theory does the inventor provide society with the information of invention: in practice, he discloses the information required by the patent system, not the information required by society to replicate and develop his invention." This raises questions both about the justice of the system if it is not equitable in its functioning and about whether its application fails to meet the objectives for which it is designed. Currently, patents are also very unevenly distributed globally, as "industrialised countries hold 97% of all patents worldwide"[27].

Clear evidence that the patent system has stimulated the development of new products and technologies, which otherwise would not have been developed, is only available for a few sectors (such as pharmaceuticals). In other sectors, patents are sometimes considered to have mainly anti-competitive effects: they serve to secure and strengthen the position of market leaders and limit the entry of new competitors. Indeed, they were used in this way in the 19th century (see section 5). In the extreme, they may actually slow the pace of innovation if a dominant firm possesses a powerful pool of patents that limits the ability of other firms to further improve existing products and technologies and acts in an anti-competitive way.

Although policymakers have sought to limit the adverse effects of patents through revised IP legislation, competition policy, and other business regulations, the anti-competitive implications of patents remain a cause of concern, for example if patent pooling and cross-licensing between a few firms in effect creates a cartel keeping others out[28]. Such concerns have regained momentum with the emergence of patents on biotechnology products and processes that cover fundamental research tools, human genes, GM plants, and other living organisms.

2.1.1 In industrialised countries

Today, the industrialised countries' IP regimes provide quite high levels of protection and these were developed piecemeal as it suited the economic development needs of the particular country[29]. In theory, stronger patent rules should encourage more research and development (R&D) in countries where they operate. But there is only limited empirical evidence that, even in industrial countries, stronger IP protection leads to increased investment in R&D. This is partly because of the difficulty of separating cause and effect - IP may stimulate more investment, but countries that invest more in R&D may demand more protection.

Although IP rules restrict direct imitation, they can assist in the diffusion process of new knowledge within and between economies. Patents, for example, provide published information, which, if it is properly disclosed, other researchers can also use to develop innovations. The World Bank found that the level of IP protection appears to positively influence the degree of foreign direct investment (FDI), the vertical integration of multinational firms, and direct technology transfers through technology sales and licensing agreements. However, according to other studies, the relationship between protection

Box 2. Patents

A patent prevents someone from making commercial use of what is claimed in the patent without the authorisation of the patent holder. To be patentable, an invention must be:

- non-obvious for someone skilled in the art, i.e. not simply be an extension of something that already exists but require some inventive step;
- novel, i.e. not previously known; and,
- industrially applicable in some way.

Patents must be given for products and processes and last for a fixed period, now at least 20 years, after which the invention moves into the public domain and can be used by anyone. They are territorial and only apply in the country in which they are granted. No one is obliged to apply restrictions to patented products or processes outside the jurisdictions in which those patents have been granted.

The detailed rules on patents vary between different national jurisdictions. In return for the temporary partial monopoly granted by the patent, the inventor should make a full disclosure of the nature of his invention understandable to anyone else skilled in the necessary arts or sciences. Others can try to invent something better, but sufficiently different, so as not to infringe the claim of the original patent.

[24]World Bank (1998) Knowledge for Development - World Development Report 1998/99. :OUP. p33

[25]Dutfield G (2002) Literature survey on intellectual property rights and sustainable human development. http://www.ictsd.org/unctad-ictsd/ - Also Policy Discussion Paper: Intellectual Property Rights and Development at the same web site

[26]Macdonald S (2001) Exploring the Hidden Costs of Patents., Geneva: Quaker UN Office Occasional Paper 4. www.quno.org, Geneva pages

[27]UNDP (1999) Globalization with a Human Face - Human Development Report 1999. Oxford: OUP. p 68

[28]See note 8 p 52ff

[29]Tansey G (1999) Trade, Intellectual Property, Food and Biodiversity: Key issues and options for the 1999 review of Article 27.3(b) of the TRIPS Agreement. London: Quaker Peace and Service. Section 1. www.quno.org

and FDI is not well established.

There are costs related to the granting of intellectual property protection (IPP). Since they increase the market power of right's owners, this may lead to higher consumer prices. Indeed, the rationale for patents in the pharmaceutical industry, for example, is that the exclusive rights they confer allows the industry to charge high prices for products and so recoup its R&D costs. Once drugs go off-patent and generic suppliers enter the market prices fall, often dramatically. IPP also, according to the World Bank 'shift[s] bargaining power toward the producers of knowledge, and away from its users'[30]. Stronger IPP may lead to a higher cost of acquiring knowledge and so may adversely affect follow-on innovations that draw on inventions whose patents have not yet expired. They may even 'slow the overall pace of innovation'[31] as can happen when firms use patent clustering and bracketing to try and prevent others from competing with their product. "'Clustering' means "building a patent wall around a product", preferably consisting of a large quantity of interlocking patents. 'Bracketing'means surrounding a competitor's key patent with so many of one's own that that it cannot be commercialised"[32].

It is difficult to determine the scope of the different forms of IP - the length and breadth of protection - so as to maximise social welfare and to achieve a fair distribution of benefits. Too weak protection may lead firms to invest less than socially desirable in the creation of new knowledge. Overly stringent protection may lead to wasteful R&D spending as firms compete to be first to innovate, which may make public R&D more socially desirable than private R&D. Only rarely will 'a single level of protection for all technologies or sectors maximise domestic welfare' as the trade off between the economic benefits of innovation and imitation will depend upon the sector involved[33]. This makes it difficult to achieve the right equitable balance both within countries and between countries with very different circumstances.

US economist Keith Maskus, acknowledges that "there are legitimate reasons to be concerned about the highly protective standards that have emerged recently in the United States and the European Union. These laws and judicial interpretations provide broad patent protection for software and biotechnological inventions. They also promote extensive rights in the formulation of databases, which could have a negative effect on scientific research. It remains to be seen whether such standards tilt the balance within those jurisdictions toward the private rights of inventors and away from the needs of competitors and users[34]."

Overall, the economic effects from stronger IPP are far from simple or agreed. However, it seems clear that companies will not use GM to modify plants and animals unless they can recoup their investment in research and product development. Patents were developed for manufactured goods, where companies can expect repeat business as fashions change or items wear out. New plant varieties and many biotech goods, however, are living organisms which can reproduce themselves and so may not require repeat purchases. To ensure a return on investment and a future income stream from these inventions, companies want IP rules, especially on patents and plant variety protection, to be extended globally to cover the original material and subsequent generations of newly-developed life forms such as new plant varieties. An alternative for some crops may be to breed varieties that will not reproduce (see section 1.1.2). Such seeds would not require legal agreements or enforcement officers to stop farmers reusing them, as are currently being used in North America and parts of Europe.

2.1.2 In low- and middle-income countries

The effects of IP protection become even more complex when producers and users of knowledge are in different countries with different economic levels of development. Theoretically 'it is far from clear that all countries should be required to maintain the same level of intellectual property protection'[35]. If a country has limited innovative capabilities and primarily consumes foreign innovations, stronger IP protection may lead to 'at least short-term consumer welfare losses and may discourage imitation and adaptation by competitors, which themselves constitute valuable economic activities'. For example, in some poor countries with patent systems like India, patent protection was not allowed on certain products, such as pharmaceuticals. The absence of patents enabled their infant industries to examine and copy products and develop local production capacities - as the now industrialised countries did in the 19th and 20th centuries. This may have inhibited inward investment but it may also have produced net economic benefits for the country.

IP rules can also disadvantage poor countries "by increasing the knowledge gap and by shifting bargaining power toward the producers of knowledge, most of whom reside in industrial countries!"[36]. While accepting the point, some see such a view of IP as far too narrow, equating knowledge producers with commercial and research-based producers. They consider the focus should be more on the role played by farming communities in poorer countries in producing knowledge about plants and animals[37].

IP also poses poorer countries with a challenge because "so many industrial-country firms are acquiring strong intellectual property positions, often covering fundamental research tools as well as marketable products, that it may prove hard for new firms and researchers to elbow into this new global industry"[38]. Maskus argues "It is not to early to claim that they [current minimum patent requirements] are inappropriate for developing economies and net technology importers.[39]" Inappropriate or not, the changes to the global IP regime over the past 20 years discussed in the next section mean that minimum levels of IPP now apply to many low- and middle-income counties.

[30]See note 24, p 35

[31]See note 24, pp 34-5

[32]Cited by Dutfield G see note 27 from Rivette K G and Kline D (2000) Rembrandts in the Attic: Unlocking the Hidden Value of Patents. Boston: Harvard Business School Press

[33]Trebilcock M J and Howse R (1995) Trade Related Intellectual Property (TRIPS) in The Regulation of International Trade. London: Routledge, pp 250-1

[34]Maskus K E (2000) Intellectual property Rights in the Global Economy. Washington DC: Institute for International Economics pp 237-8

[35]See note 33

[36]See note 24 p 35

[37]Solomon T and Edwards S (eds) (1996) The Movement for Collective Intellectual Rights. Addis Ababa: Institute for Sustainable Development and London:The Gaia Foundation

[38]See note 24

[39]See note 34 p 238

3. TRIPS on the farm

Since the early 1990s, there have been major changes to the regulatory framework governing the use of plants and animals globally as a result of negotiations in a confusing and complicated set of international institutions – in environment, agriculture, trade and intellectual property (see Figure 2). Usually, different national government departments are involved in each of these negotiations, often with too little coordination between them[40]. Two related major international agreements - the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) – deal with plants and include some provisions on IP and Farmers' Rights and those of indigenous peoples. A specific convention dealing with plant breeders' rights administered by the International Union for the Protection of New Varieties of Plants (UPOV after its French title) was also revised. Negotiations at the World Intellectual Property Organisation (WIPO) also affect the IP rules. All are discussed in more detail in Annex 1. It is the Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS), however, which is ushering in a new global IP regime.

3.1 TRIPS

TRIPS originated from a small number of major business interests with a handful of corporations and lobbyists responsible for drafting its terms and pushing, via various developed country governments, the agreement through the Uruguay Round and into the WTO[41]. "It was not just arrogance on the part of James Enyart, director of international affairs at Monsanto Agricultural Company, which led him to boast that 'Industry [ie the IPC] has identified a major problem for international trade. It crafted a solution, reduced it to a concrete proposal and sold it to our own and other governments.' It was also the truth"[42] The IP provisions in TRIPS were developed with very little public involvement and introduced into the Uruguay Round of Talks in the General Agreement on Tariffs and Trade (GATT) against strong, but in the end, futile opposition from low-and middle-income countries.

The TRIPS Agreement is one of the three pillars of the WTO - the others being trade in goods and trade in services. TRIPS is law for all members of the WTO, sooner or later (least developed country members have until 2006 to comply and may seek extensions to that deadline). It requires them all to adopt the same, relatively high, minimum levels of intellectual property protection (see Figure 3) including for patents and plant varieties. Higher levels of protection are allowed, but not lower ones. TRIPS also requires countries to introduce a legally binding enforcement mechanism to ensure its provisions are adhered to, and its provisions are backed up by a dispute settlement mechanism in WTO with sanctions in any area of the WTO regime for non-compliance with its rulings. It is these binding dispute settlement and sanctions provisions that make WTO a uniquely powerful international institution. Ignoring the rules in the other agreements carries no threat or sanction. Ignoring those in WTO does.

It has been argued that the minimum, 'one size fits all' approach of TRIPS is a problem. This is because the various forms of IP were designed to be of benefit to the social and economic welfare of countries, and could be adopted as and when they suited their development needs. Since conditions vary greatly between countries, variations in the types of IP and conditions applied to them may make more sense for people's well-being there. At an individual level, it is like saying that everyone must take a minimum size 8 shoe – larger ones are permitted but not smaller ones, despite the fact many peoples' shoes sizes begin well under size 8. This international extension of the IP regime is a revolution in the history of IP. It stops low- and middle-income countries doing what most richer countries did, i.e. copy others technology to catch up, only adopting specific forms of IP when it suited them and choosing the level of protection they provided to suit their needs.

The current international IP regime, unlike, for example, that in the environmental arena, has been developed by a small set of actors with relatively little involvement of civil society as a whole. These actors have been drawn mostly from the legal and industrial fields and, as "epistemic communities," are very influential in writing the rules. Such communities consist of professionals (usually recruited from several disciplines) who share a commitment to a common causal model and a common set of political values. "The dominant core of the epistemic community of intellectual property is comprised of [sic] transnational elites with important intellectual property portfolios to protect – and their lawyers"[43]. This relatively small group represents powerful corporate interests that want to have a strong international IP regime.

Despite the opposition from some low- and middle-income countries, TRIPS ended up in WTO because these countries lacked the negotiating muscle to prevent it but they did manage to gain some concessions and maintain some room for flexibility in interpreting the rules it laid down. They had to accept it as part of the overall package to come out of the Uruguay Round with the hope that the advantages gained in agreements on textiles and agriculture would provide benefits outweighing what was lost from accepting TRIPS – both in royalty flows out of their countries and in the cost of implementing the agreement. For many low- and middle-income countries, however, the full implications of the TRIPS Agreement were far from clear at the time they signed up to WTO and are only now becoming so. This is in part due to the disparity in negotiating capacity between the industrialised countries and low- and middle-income countries in these

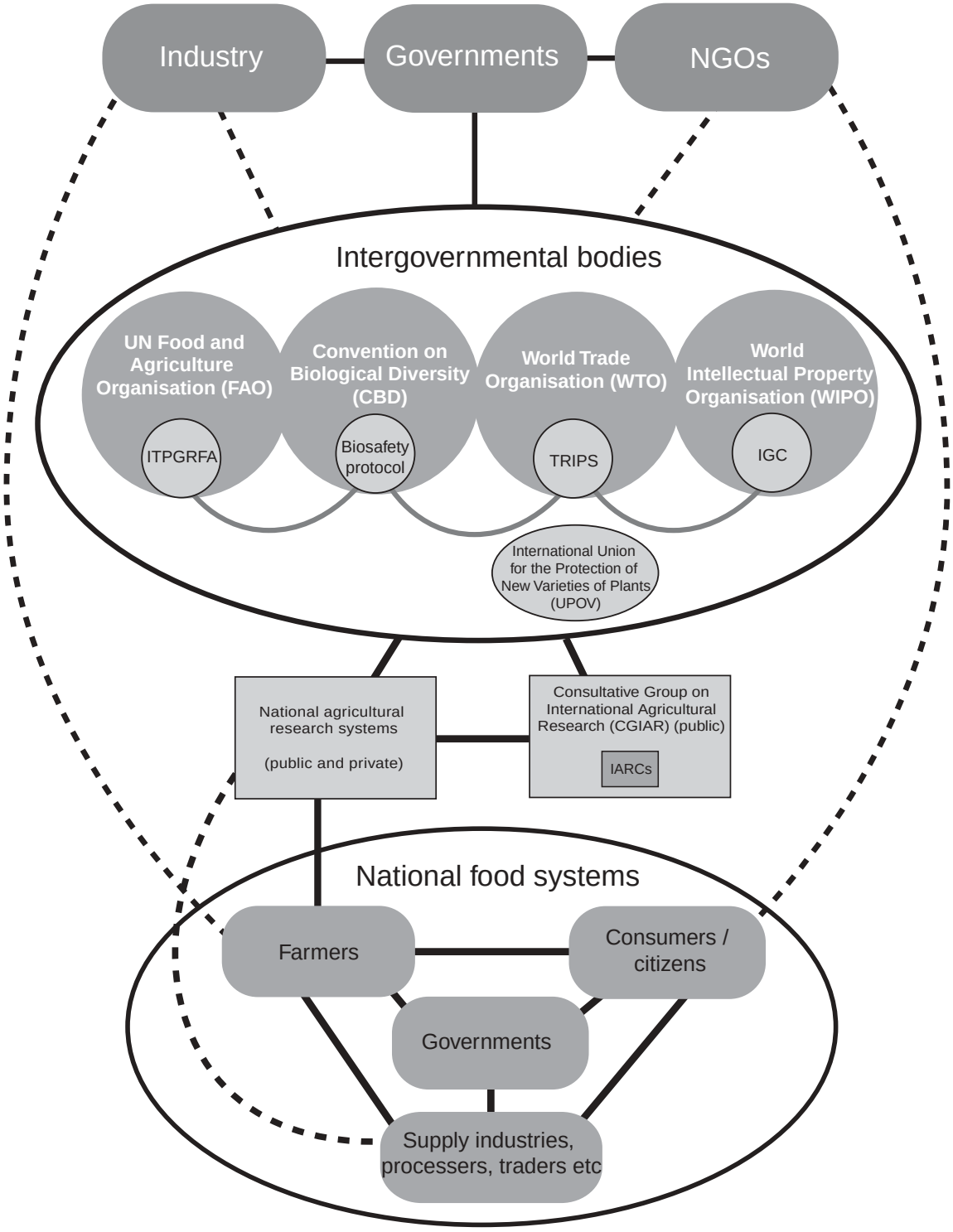
[40] Petit M et al (2001) Why Governments Can't Make Policy - The Case Of Plant Genetic Resources In The International Arena. Lima: International Potato Centre (CIP)

[41] See notes 8 and 17

[42] Dutfield G (2002) Trade, Intellectual Property and Biogenetic Resources: A Guide to the International Regulatory Landscape. Background paper: Dialogue on Trade, Biological resources and Intellectual Property Rights, Dhaka, 18 April 2002. The IPC was the Intellectual Property Committee set up by over a dozen CEO's of US corporations in March 1986. www.ictsd.org/dlogue/2002-04-19/dutfield.pdf

[43] See note 8 p 75

Figure 2. Key international organisations affecting IP and farming with some schematic relationships



Legend: see opposite

WTO Established 1995, 144 Members, 31 applicants. HQ - Geneva

- 28 agreements, one package, for trade liberalisation
- Binding dispute settlement mechanism, cross sectoral sanctions provisions

Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)

Sets minimum requirements for IPRs in 8 areas which must be enacted into national law in WTO members.

Enforcement mechanisms required.

Built in review mechanism of agreement

Monitored by a council of WTO members

WIPO Established 1970, UN agency in 1974. 179 members. HQ - Geneva

Promotes protection of intellectual property. Home of technical discussion of IP and administers 23 international IP-related treaties.

Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC) set up in 2000 to discuss issues arising in these areas.

CBD Agreed at Rio Earth Summit, 1992, 183 parties (a few not ratified, inc USA).

Secretariat - Montreal

Conservation, sustainable use of biological resources, and benefit sharing from their use. IPRs not to interfere with this, but rules to fit IPRs. Sees bilateral deals as way to achieve aims. Requires Prior informed consent for access.

Up to states to enact as see fit.

Biosafety Protocal, agreed in 2001, but leaves liability issues still to be decided

Access and benefit sharing guidelines agreed in Bonn in 2002

FAO Founded 1945, 184 members, HQ - Rome

International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

Agreed November 2001, 46 parties, Secretariat. Based in FAO

Sets up a multilateral system to provide access to a specific range of plants important for food to avoid the cost of bilateralism. Includes provisions to provide compensatory payment to a global fund should any materials drawn from the system have patents taken out on it.

National governments to enact rules implementing Farmers' Rights.

UPOV Established in 1961, 50 members. Secretariat - Geneva

Member countries subscribe to a Convention (revised in 1972, 1978 and 1991) that establishes the terms governing Plant Breeders' Rights.

CGIAR Established 1971. 22 developing and 21 industrialised countries, 3 private foundations, and 12 regional and international organisations are members. Secretariat, Washington DC

International Agricultural Research Centres (IARCs)

16 are financed by the CGIAR. They hold about 600,000 accessions in their various genebanks - about 40 per cent of the global total - mostly collected before the CBD was signed. The collections are held in trust by the CG for the benefit of humankind through an agreement made with FAO in 1994 and the food crops in them will be covered by the new ITPGRFA.

kinds of international negotiations.

In general, negotiations dealing with the environment, food, and latterly trade, have had a wider range of civil society participation in their deliberations, both domestically and internationally, than has been the case with those dealing with intellectual property. Only now are the broader interests catching up with the changes that have been made in IP.

3.1.1 TRIPS and farming

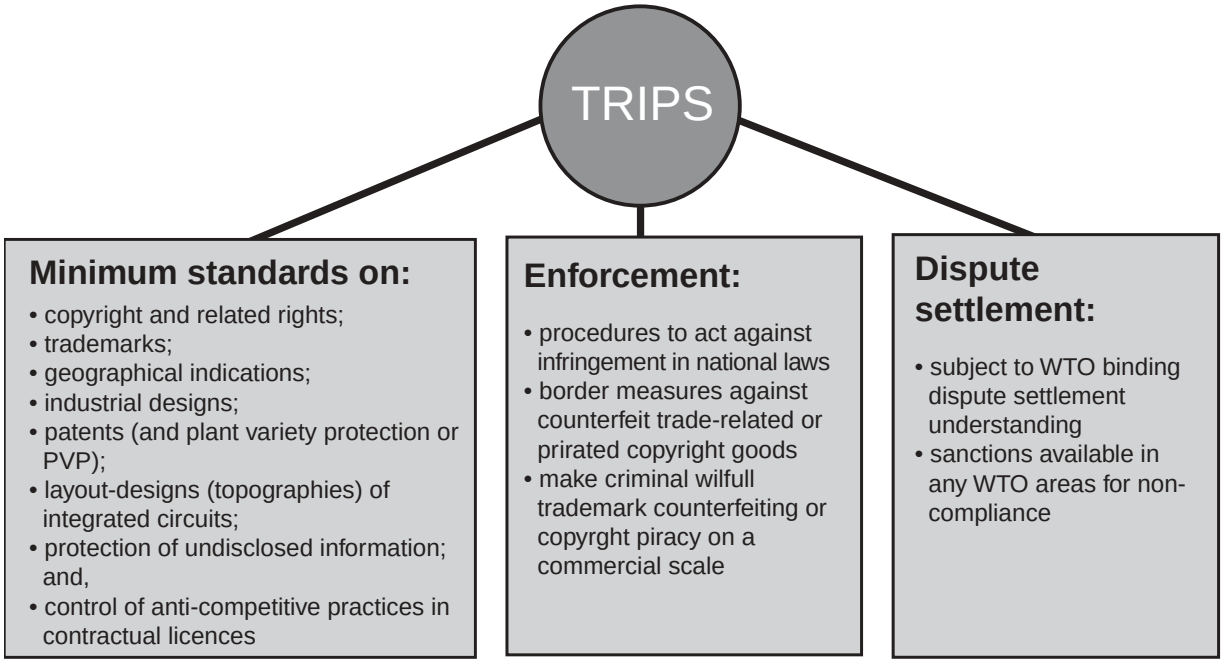
Prior to TRIPS, countries could decide whether or not to provide any form of IPP in agriculture. Most low- and middle-income countries did not. The US only did so in plant breeding from the 1930s, when it passed a Plant Patents Act with a restricted coverage of crops. The Europeans did not wish to have patents applied to plants and developed an alternative for plant varieties that became UPOV, but this only took effect in the 1960s. Only since the 1980s, has the patenting of living organisms and parts of them such as genes flourished in some industrialised countries, . It is patents and plant variety protection (PVP) that are most important forms of IP for farming.

Under TRIPS, all WTO Members must allow patents to be available for any inventions, whether products or processes, in all fields of technology without discrimination. Some countries, such as the USA, wanted no exception to this during the TRIPS negotiations, but others such as India and Brazil, were strongly opposed, for example, to granting patents on life-forms or medicines.

In order to conclude the negotiations, a compromise was agreed using deliberately ambiguous language, which is not defined in the agreement. This gives WTO members discretion about whether or not they allow plants, animals, biological processes for the production of plants or animals and plant varieties to be patentable (see Annex 1 for more details). However, Members must provide patent protection for micro-organisms and non-biological and microbiological processes for the production of plants and animals (see figure 4). Members must also either grant patent protection for plant varieties or provide protection by means of an effective *sui generis* (of its own kind) system. A *sui generis* system means the form of IP protection is designed for that particular thing, not simply an existing form of IP protection such as patents extended to that thing. The provisions of this Article (27.3(b)) were up for review in 1999 but this review has still not been completed owing to continuing disagreements.

The final language used was open to various interpretations – especially since no terms are defined in the TRIPS Agreement – unlike in the CBD. This provides what some negotiators call 'constructive ambiguity' and, as far as low- and middle-income countries are concerned some degree of flexibility. It is a bit like saying that every country must allow ball games to be played on grass pitches but then allowing countries to decide on the size and shape of the ball, and the actu-

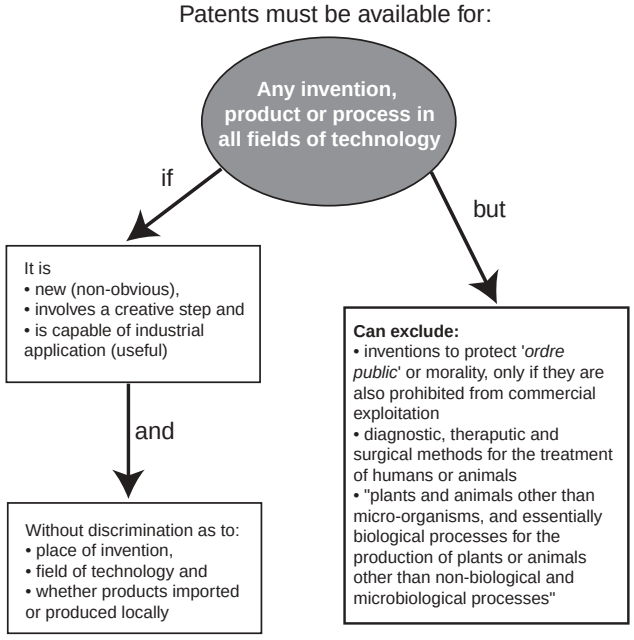
Figure 3. Key elements of the TRIPS Agreement



al size of the pitch.

The interpretive flexibilities in TRIPS mean countries can still exercise some discretion about how they frame their patent rules and need not permit the patenting of plants and animals – and indeed some are using this exception, eg Argentina, Brazil, Andean Pact countries[44]. While they need to permit patenting of microorganisms, they may define these narrowly and disallow the patenting of naturally-occurring micro-organisms, as again many are doing, and only allow patenting on micro-organisms that have been genetically-engineered[45].

Figure 4: TRIPS on patents (Article 27)



In the agribiotech area at present, companies mostly seek patent protection in the US, Canada, Western Europe, Japan, Australia, some countries in S E Asia like Taiwan and the Philippines, very few in Africa, and the large economies in Latin America. However, thanks to the way the terms can be defined and interpreted nationally, things that may be patented in the USA, such as plants and animals, may not be permitted to be patented in other countries. Thus, holders of US patents on plants and animals might not be able to get patents on the same things in other countries, even if they applied for them, if they cover materials outside the scope of the national patent law in question.

There is a catch, however, as under TRIPS rules if a patented product, or a product produced using patented processes, is produced in a country where these patents do not apply and is then exported to a country where they do, then those products could be barred from being imported into that country by the patent holder. Thus, there is a clear economic incentive not to use patented products or processes for things that will enter into export markets to countries where patents are held on the products or processes concerned. The major commodity crops, where private R&D sees major opportunities, are likely to pose much greater difficulties for researchers in developing countries and the International Agricultural Research Centres (IARCs) than crops of local, regional or subsistence significance where there may be less commercial

[44]Bolivia, Columbia, Ecuador, Peru and Venezuela

[45] Llewelyn M and Adcock M (2000) Micro-organisms: definitions and options under TRIPS. www.quno.org

interest. However, even here, if some of these are patented in industrialised markets that could block exports of what may be niche products there (see box on biopiracy in Annex 2).

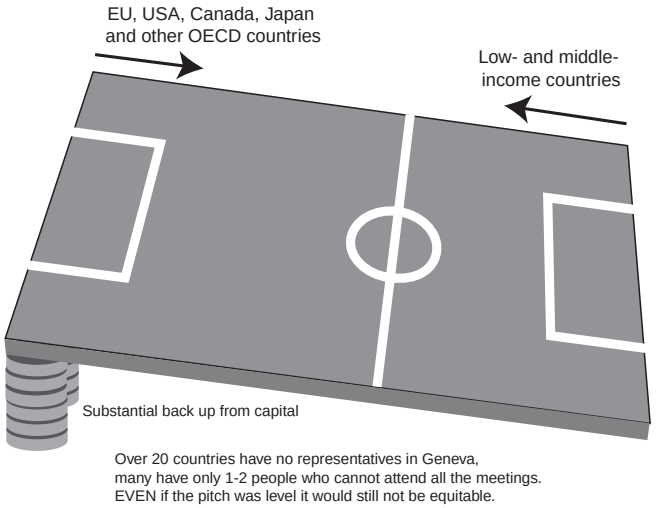
3.2 Rule-making processes

Irrespective of the content of the TRIPS rules, we have grave concerns about the fairness of the whole process involved in arriving at them. The TRIPS rules were written as a result of a power play between different but relatively narrow interests, with those of industrialised countries and a few major industries largely getting their way. They extend IP into agriculture in many low- and middle-income countries for the first time. Even in the industrialised world, where the extensive use of various forms of IP is hundreds of years old, the use of IP in agriculture is quite recent. This bold experiment in extending a form of IP into a field for which it was never developed through a process of redefinition, judicial interpretation and power politics is contentious to say the least even among some leading IP specialists in the industrialised countries. Doing so globally is an untested and possibly risky experiment largely in the private interest of small numbers of people and corporations with expansive claims about the benefits for all.

Experiments may not give you the results you expect. If they do not, and this extension of IP turns out to be either a mixed blessing or even a disaster, important questions remain as to who will suffer, and who will carry the can – in lost livelihoods, in hunger, in social dislocation. The answer is that society as a whole will, unless we also have systems in place so that those who expect to get the main benefits are also ready to suffer any adverse consequences if their promised innovations turn out to cause major problems in something so fundamental as our food supply. After all, we are not talking about electronic gadget manufacturers.

A Church of Scotland Society, Religion and Technology Project working party has argued that there is a growing democratic deficit that is developing in our increasingly globalised society where momentous decisions which could alter the whole future course of humanity are taken in fora which are outside democratic control[46]. The TRIPS agreement is a case in point (Figure 5). The whole of the current international IP regime, unlike, for example, that in the environmental arena, has been developed by a small set of actors representing powerful corporate interests who have a strong IP regime

Figure 5: Negotiating inequities: the unequal playing field



with relatively little involvement of civil society as a whole. Slowly, however, there is emerging a growing pressure from a broadening range of groups to rethink the current regime, troubled as it is by a whole range of ethical concerns over the extension of patents to lifeforms, their impact on food and biodiversity, and the way in which these international agreements are arrived at.

This is something to be welcomed and encouraged, if it leads to a fairer set of rules less unbalanced than those at present seem to be. However, if implementing the current rules shows that they should be changed to better suit the needs of sustainable food production supportive of people's livelihoods it is unclear if fair processes to achieve this exist. This is especially true if this might require abandoning or discarding the rules and returning to a situation with far fewer restrictions on the flow of information and use of products or processes by anyone in the area of food production – at least for agreed crops and specific countries or regions. **We believe that the processes for making the rules need to be more balanced and fair and that special and differential treatment should be available for farming and food security in low- and middle-income countries.**

[46]Bruce D and Bruce A (eds) (1998) Engineering Genesis - The Ethics of Genetic Engineering in Non-human Species. Working Group of the Society, Religion and Technology Project. Church of Scotland: Earthscan. Ch. 10

4. Inventors and innovation

Clearly, as discussed above, there is a great deal of controversy about the role IP plays in society. Various questions arise including that of what agricultural research is for? How is freedom to invent and be creative distributed across different groups? Who is recognised, supported and rewarded for doing it? Where should the balance lie between there being a fundamental freedom to research, an autonomy or choice argument, and the need to justify research on the basis of wellbeing of the community at large? How far do we as societies give space for the creative individuals to pursue research goals in universities and research labs to increase our understanding or operate via private companies which may want to capture and control any results and benefits? Where does accountability and liability for the consequences of innovation fall? How fair or just is the system in encouraging creativity and rewarding it? TRIPS recognises that IPP represent a balance between the private individual's interest (or nowadays the corporation's interest) and that of society and communities in releasing and facilitating the creativity of its members for the general public good and for social and economic welfare.

A key justification used for various types of IP is that they encourage technological or artistic creation. Invention is supposed to lead onto innovation in particular fields but innovation requires much more than simply a new method, product or expression of art to be created. It also requires suitable social and economic conditions for the invention to become the basis for a new way of doing things that brings some social benefit.

James Boyle argues that a rather romantic vision of inventors and authors pervades discussion in this area and this lies behind the dominant justification for awarding patents, copyright and other forms of IP. But, he says, "this is a bad thing for reasons of both efficiency and justice; it leads us to have too many intellectual property rights, to confer them on the wrong people, and dramatically to undervalue the interests of both the sources of and the audience for the information we commodify"[47]. As Drahos notes, "creativity…involves individuals in dual and contrary roles…the role of inventor, pioneer, innovator, genius and so on…[and] that of the borrower and copier. When intellectual property rights are claimed, right holders often lose sight of the duality of roles they have occupied, preferring to think of themselves exclusively in terms of creator and demanding protection against other borrowers and copiers. Intellectual property law..helps…to embed an individualistic notion of creativity".[48] In fact an intellectual commons is crucial to creativity, he argues, and provides an unusual resource that grows in strength through use and exploitation and which also means it should not be depleted but continue to be enlarged.

The new IP regime may affect the freedom of some to research, to invent, to innovate in research institutions and in communities all over the world. Already, even in the industrialised countries, there is concern that the current high levels of IP protection is inappropriate[49].

4.1 People invent, institutions appropriate

Creativity is a fundamental aspect of human beings. It is fair and just that people should have the opportunity to be creative. The Universal Declaration on Human Rights acknowledges that everyone should both be able to partake in the benefits from their creativity and receive some protection for the things they produce (Box 3).

Human rights are inalienable. They cannot be divorced from or assigned by anyone to someone else, but are integral to them. The various forms of IP may be a way of providing material rewards but should not be thought of as human rights. They can be assigned, licensed, bought and sold. Indeed, many patents are held by companies and form their key assets in the case of small biotech companies. And for many people today, whether in universities or companies, the IP in their creativity and invention belongs to their institution. Companies themselves, of course, are also a legal fiction, one which has been given the, again fictional, judicial equivalence of a real person. Even so, we should not confuse them with real people. For it is human beings who are creative, who enjoy that creativity and also share knowledge and receive recognition. What we have developed are various institutional forms to harness and organise that creativity and in so doing produce a motor to drive the interests of institutions through their capacity to harness and appropriate the skills of their employees. Assembling inventive and creative people in an institution can give that institution great dynamism.

In these formal institutional systems, technological innovation is a way of entering an industry, and patent-protected innovation can be used as a means of gaining legal quasi-monopolistic control of certain products and sectors. It occurred in the 19th century, when inventors like George Eastman (Kodak) and Thomas Edison, sought patents to

Box 3. Universal Declaration of Human Rights

Article 27

1. Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits

2. Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which they are the author

[47]See note 6 pp x-xi

[48]See note 1 p 62

[49]See note 34 p 237-8

enable them to capture monopoly profits. By institutionalising innovation in R&D labs in the 19th century "large corporations sought to control technological change as a means of protecting and fortifying their positions in the industry"[50]. They still do today – and very extensively in biotechnology.

4.2 Invention and innovation in farming

In farming, there are both formal and informal systems for innovation. The former tend to be in the industrialised countries and involve commercial and public sectors while elsewhere they are mainly public sector based. The latter include smallholder farmers in communities the world over, but especially in the low- and middle-income countries where farming is still the main source of livelihood for a large percentage of people.

For over 10,000 years agricultural development has stemmed from the creativity and innovation of generations of smallholder farmers that have produced the wide range of plant varieties and animal breeds of today, the agricultural biodiversity[51], as well as the range of farming methods, water capture techniques and so on. Only for about 150 years, since the advent of industrial farming practices, has this been supplemented by more formal public and private systems. Much agricultural research has been carried out by public bodies – and spread to farmers - largely as a public good, since, it is argued that, those needing its results do not have sufficient resources to do the research themselves, and the benefits flowing from 'improved' agriculture go to society as a whole.

When the current international agricultural research system was established in 1971(see Annex 2), the free exchange of germplasm (seeds, tubers and other propagating material) and of scientific knowledge were the norm and public funding largely underpinned agricultural research as a public good (Annex 2). Indeed, Joseph Stiglitz, former chief economist at the World Bank, argues that, in general, "basic research and many other forms of knowledge are not, and almost certainly should not be, protected by an intellectual property regime. In these areas efficiency requires public support. And public support must be at the global level."[52]

National governments and donors together also helped fund considerable R&D nationally in many low- and middle-income countries. Their work did not depend on IPP and from the mid–1960s provided the high-yielding varieties of seeds that made the Green Revolution a reality[53]. The benefits from this plant breeding in the major food crops, such as wheat and maize, are also estimated to be worth billions of dollars to the economies of the industrialised countries[54].

Today, the level of donor funding and, in some countries, national funding, has declined, science is increasingly proprietary and much more agricultural research is carried out privately (see Annex 2 for details). The private sector has assumed a growing role in the industrialised countries, with their small farming populations and wholly commercial farming systems, and has led the development of biotechnology, with firms seeking IP protection over both the research processes and products derived from them. This can affect the ability of other researchers to conduct their work. Private-sector led R&D also naturally focuses on areas where it can best ensure returns on its investment.

Only 'inventions' in these formal systems are the subject of IP. Moreover, when patents are granted, the invention claimed often builds on earlier work but the final person to make a change receives the benefits of exclusive use. Others who might also be working to produce the same or very similar things lose out as the patent system is a 'winner takes all' system. And with Plant Breeders Rights, varieties discovered in one place can be protected in another.

4.3 Agricultural R&D

One key question is whether the extension and strengthening of IP will inhibit the use of R&D processes and products, including biotechnology, that would benefit poor people in low and middle-income countries, through its effects on international and national agricultural research (see Annex 2). Many fear it will. "A commercial consequence of the intrusion of intellectual property into agricultural research has been the concentration of key intellectual property rights in the hands of a small and declining number of private life sciences companies. A result of this market concentration is to lock up key intellectual property in the hands of a few powerful entities and to raise the barriers to market entry of others wishing to participate in these activities" says Michael Blakeney, Professor of Intellectual Property at Queen Mary College, University of London. Researchers often have to sign restrictive agreements to use various techniques and products of biotechnology, for example, DNA markers which may be patented in industrialised countries, so the developers can prevent their use by competitors. By the end of 1998, for example, the top five vegetable seed companies controlled 75% of the global vegetable seed market[55]. This new environment for international research may affect what technologies may be applied – ideally royalty free - for the benefit of poor farmers.

Another concern is whether the major focus on patent-protected biotechnology-based R&D will skew the overall research effort away from other approaches to improve farming, especially for the majority of poor and marginalised farmers? These approaches could include better water management techniques, more appropriate tools, and integrated pest management techniques, use of agroecological systems, the benefits of which would not be so easily captured by companies but might be of as much, or greater, benefit in improving the food and livelihood security of poor and marginalised farmers.

Patents in particular are closely linked to today's biotechnological innovation. They have underpinned the develop-

[50]Jenkins R (1975) Images and Enterprise: Technology and the American Photographic Industry 1839 to 1925. Baltimore: Johns Hopkins University Press. pp 6-7

[51]Agricultural biodiversity includes the diversity of genetic resources, varieties, breeds, sub-species and species of crops, livestock, fisheries and microorganisms used for food, fodder, fibre, fuel and pharmaceuticals. Agricultural biodiversity results from the interaction between the environment, genetic resources and the land a water resources and management systems and practices used by culturally diverse people, for food production. From: Forum for Food Sovereignty (2002) Sustaining Agricultural Biodiversity and the integrity and free flow of Genetic Resources for Food and Agriculture, p 7

[52]Quoted in Pinstrup-Andersen P (2000) Is Research a global public good? in entwicklung + landerlicher raum, No 2

[53]Dhar B. (2002) Sui Generis Systems for Plant Variety Protection: Options under TRIPS., Geneva: QUNO. www.quno.org

[54]Pardey P G et al (1996) Hidden Harvest: U.S. Benefits from International Research Aid. Washington DC: IFPRI

[55]Blakeney M (2001/2) Intellectual Property Rights and Food Security in Bio-Science Law Review, 4, 5 p 9

ment of biotechnology by private industry as they help offer the prospect of private profits[56]. They have also contributed to a restructuring of the market and centralisation of firms. The US seed industry, once the preserve of many small firms, has become dominated by five major firms – in part as a response to litigation over broad patents awarded in the early days of GM in the USA. Such mergers and acquisitions were the easiest way to resolve some of these disputes, and are the ultimate in cross-licensing, saving firms the expense and difficulty of negotiating the use of others' patented products and processes. The increased investment in product development also requires stronger marketing ability, bigger markets and the legal capacity to defend corporate interests, with firms putting considerable effort and money into both.

According to Heinz Imhof, chairman of the board of Syngenta, itself a merger of the agribusiness interests of AstraZeneca and Novartis, "Industry consolidation in pursuit of economies of scale will continue. Research in biotechnology, with seeds as the key platform for delivering biotech traits, offers opportunities for higher-value, higher-quality outputs and increased returns in future…Finally, consolidation at the dealer and distributor levels will continue"[57]. The potential of this technology to create IP protected products and the consequent profits from them influences both the areas chosen to research and the market structure in which the results will be marketed.

The biotech firms are interested in the major grains and industrial crops in industrialised and some large middle- and low-income countries with nascent biotechnology industries, such as India, Brazil, Argentina and China, and they control many of the advanced technologies needed to reshape them. The crops being marketed are the key traded food and fibre crops of GM soya beans, maize and cotton and the main traits being bred into the crops are for pest resistance, herbicide tolerance or a combination of these[58]. Despite increased costs for the seed they claim to offer farmers savings in other inputs and so may be economic from the farmers' viewpoint. Other GMOs are being developed which will most likely be of more interest to wealthy consumers than to poor farmers. These will have altered nutritional qualities or appearance and may ultimately provide novel products or old products in new guises (edible vaccines, for example). The development of so-called functional foods is of major interest to food manufacturers and retailers as it offers many potentially profitable niches in an already oversaturated market in the industrialised would.[59]

4.4 Plant breeding and seed provision

Formal seed production systems linking public and private R&D and breeding companies dominate seed provision in industrialised countries. More informal seed production systems with production largely carried out by a mixture of farmers and public institutions exist in many low- and-middle-income countries. The extension of patents and plant variety protection (PVP) in the form of plant breeders rights (PBRs) in agriculture is already having some adverse effects on the exchange and use of plant genetic resources, as is discussed in more detail in Annex 2. The expansion of these forms of IP in plant breeding has also fuelled a strong sense - in poor countries and in some in the international agricultural research system - that an implicit agreement has been broken: with germplasm used in breeding programmes largely provided by the South for free being still in the public domain, but with science becoming increasingly proprietary[60]. This affects attitudes to negotiations across a number of fora, including on implementation of the CBD and the new International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).

There is also a sense of unfulfilled promises which the low- and middle-income countries have about commitments made both in the CBD and TRIPS to transfer technology to them. These feelings are fuelling development of national access laws to genetic resources that could seriously hinder the collection and dissemination of materials amongst researchers, including those in the IARCs. The new International Treaty and rules on the use of the collections held in the IARCs genebanks to be agreed by the Treaty's governing body may help minimise any impact on food crops. However, the best way to ensure continued viability and development of the many landraces developed by smallholder farmers is for them to be maintained and used in the field, which PBRs do nothing to assist. [61]

For those food crops and forages not included in the international treaty – and there are a considerable number, especially minor crops and their 'wild' relatives – there may be much greater transaction costs in using germplasm, which could adversely affect their development[62]. A study commissioned for the Global Forum on Agricultural Research (GFAR) concluded that a "scenario in which all germplasm exchange falls under bilateral agreements entails excessively high transaction costs" and felt that only for very few crops, such as industrial crops that originate in only one or two countries e.g. soybeans, might a bilateral approach to germplasm exchange have acceptable transaction costs.[63] Put simply, it costs money to deal in IP.

4.4.1 sui generis *Plant Variety Protection*

WTO members are obliged to introduce an effective form of plant variety protection (PVP) if they do not use patents for plant varieties. One possible *sui generis* system likely to be recognised as effective is the UPOV system of Plant Breeders' Rights (PBRs), but this may be too focussed on the needs of commercial breeders and farmers and not be suitable for all countries (see Annex 2). The alternative is for countries to develop their own solution with special legislation protecting plant varieties appropriate to their situation. However, this is a challenging task that may take some time.

[56]John Barton, "Intellectual Property Management", 2020 Vision, Focus 2 – Biotechnology for Developing-Country Agriculture: Problems and Opportunities. Brief 7 of 10, IFPRI, 1999

[57]Syngenta 2002 Annual Report

[58]James C (2000) Global Review of Commercialized Transgeneic Crops: 2000. Ithica: ISAAA. , www.isaaa.org

[59]Heasman M & Mellentin J (2001) The Functional Foods Revolution- Healthy people, healthy profits? London: Earthscan

[60]Serageldin I (2000) International Cooperation for the Public Good: Agricultural Research in the new Century. Dresden: GFAR, Dresden. http://www.egfar.org

[61]Landraces are the types of plants (and animals) developed by farmers but do not consist of one type of seed for example but rather mixtures of types of seed that will produce crops in a range of conditions (such as drought, normal and heavy rainfall, or are resistant to a range of pests and diseases) thus minimising the risk of a complete harvest failure.

[62]Stannard C (2000) The relationship between Article 27.3b of the WTO TRIPS Agreement and the FAO Undertaking on Plant Genetic Resources. paper presented at the Workshop On TRIPS, The Convention On Biological Diversity and Farmers' Rights, organised by The South Centre, in collaboration with the Istituto Agronomico Oltremare, Geneva, Palais des Nations, 23 June 2000

Although many countries are working on such legislation, only India has adopted such legislation that takes on board elements of UPOV of benefit to commercial breeders as well as those from the ITPGRFA to protect Farmers' Rights.

With the introduction of PVP, in particular PBRs, industry argues it will be able to undertake breeding work and also bring in foreign material to low- and middle-income countries for the benefit of their farmers, as it has successfully done in the richer countries. Others are less sure on the basis of the early evidence of such benefits, and also for other reasons, because types of "research conducted in the private and the public sector are non-substitutable as they are targeted at different farming groups [and]…the spread of proprietary control in research tools and uncertainty in the limits of ownership make the conduct of agricultural research all the more difficult by requiring complicated negotiations."[64]

Another review of possible options concludes that "the *sui generis* legislation that developing countries must introduce has to take into consideration the interests of both the farming communities and the plant breeders in the formal sector"[65]. This argues that adopting the systems developed by the industrialised countries and embodied in UPOV is not adequate and suggests approaches that take into account Farmers' Rights, as outlined in the International Treaty, and which allows a farmer to 'save, use, sow, re-sow, exchange share or sell his farm produce'.

Although there is concern about the impact of PVP, the major concern is about the extension of patenting. Even those with widely different views on greater use of PVP tend to be more concerned about its replacement by patents – expecting such an outcome, within a few years, to lead to a few major companies controlling seed production for all major commercially important crops. While PVP legislation allows further research on PVP varieties and commercialisation of that research, patenting does not (See Table A2 in Annex 1). Though there is normally a research exemption, commercialisation of anything developed requires permission of the patent holder – which can be a considerable disincentive to further work and hence block its use. It is a major problem with public goods research since the objective is to develop new products and methods and give them away.

4.5 Inventors and R&D

The reality of invention through formal research and development is some way removed from the romantic idea that lies behind popular images. Scientists seeking to improve understanding or solve problems for the good of humanity are giving way perhaps to scientist entrepreneurs seeking inventions either for themselves or their firm or university which can give rise to a patent and which can be turned into a profitable product or process to license. But if that is the aim, then it is likely to affect the types of research undertaken and be geared to those things which people can buy – and the poor cannot buy much. Some would argue that, nowadays, scientists are essentially hired hands – or rather brains – to deliver what the institution wants. The institutional desire to have some proprietary control over the product is likely to influence the autonomy with which projects are chosen and lines of research pursued or funded. While this may benefit the researcher or research organisation, it may reduce the social value in what they do in producing inventions that are freely usable by farmers, especially poor farmers, or narrow the vision they pursue.

The trend to proprietary science in agriculture, which makes much use of patents and plant breeders rights also raises major questions about the nature of R&D and which scientists will be able to do what research. The move to a more proprietary approach may affect not just the exchange of germplasm but also the exchange of ideas, experience and techniques which researchers use to spark off other ideas. Restrictions on the sharing of information resulting from the changed culture of scientific work may be as profound as the effects on germplasm flow. Basically, lawyers hate scientists talking together at conferences, potentially 'giving away' potentially valuable knowledge. As noted in an engaging and illuminating account of how genetic engineering has developed in agriculture "…if the legal staff had had its way, the scientists would have published as little as possible"[66]. Science, however, has flourished in an open, transparent, sharing cultural environment. The use of confidentiality agreements in universities and research institutions, which are also doing more and more commissioned research, is further eroding the openness to sharing of knowledge[67]. Yet sharing knowledge is desirable to promote the public good, for all. Claims to confidentiality in data supplied to regulators for approvals, eg for new crops, are also coming under greater public scrutiny and may be increasingly challenged as an unwarranted use of another form of IP, trade secrets.

We recommend that broad patents on research tools and processes and restrictions on basic information flows should be avoided. More generally, we call for a major rethink about the nature of research and development, the links between them and the effects of IP rules on the direction of research, on market structure and the public/private balance of R&D.

[63]Bert Visser et al (2000). Transaction costs of germplasm under Bilateral Agreements. www.egfar.org/home.shtml

[64]Rangnekar D (2002), "Access to Genetic Resources, Gene-based Inventions and Agriculture", Study Paper 3a, Commission on Intellectual Property Rights, p 6. http://www.iprcommission.org/documents/Rangnekar_study.doc

[65]See note 53 p 27

[66]Charles D (2001) Lords of the Harvest – Biotech, big money, and the future of food. Cambridge Mass: Perseus Publishing, p 20

[67]Kenny M (1986) Biotechnology: the university-industrial complex. New Haven and London:Yale Univ Press

5. Farmers

Farmers in the industrialised countries are generally a small percentage of the population and are commercially motivated, and fully integrated into the market economy although there is still considerable variation between them, from 'agribusinessman' to part-time family farmer[68]. They buy in their supplies and seed. In most low- and middle-income countries farmers are a much larger proportion of the population. They vary from commercial to largely subsistence farmers, from supplying export markets to national and local markets. The largely subsistence farmers, of whom there are hundreds of millions, generally save their own seed and continue to be trial and error developers of landraces, breeds and techniques. They also have little if any capital or access to credit, need risk minimising strategies and often lack secure tenure over land. The private sector tends to market and do R&D directed at the more commercial, larger farmers while the public sector focuses, with more or less success, on the smaller and subsistence farmers, supported by the International Agricultural Research Centres.

The Convention on Biological Diversity (CBD) recognises, in Article 8 (j), the need for *in situ* conservation of biodiversity and the need to protect indigenous knowledge. It requires governments, subject to their national legislation, to preserve the knowledge, innovations and practices of indigenous and local communities insofar as that knowledge, innovation and practice serves the goals of conservation and sustainable use of biodiversity. In agriculture, this comes about through its use and development in farming communities. Thus, the impact of changes brought about by IP-protected innovation in agriculture on those communities is an issue. The CBD also requires governments to diffuse that knowledge, innovation and practice with the cooperation of the holders of that knowledge and encourage the sharing of any benefits that arise from such diffusion.

The IP system fits into the commercial farming sector and the input industries that support it. Its extension into poor countries is likely to encourage the growth of private seed businesses which should provide for some farmers. The entry of biotechnology firms into this field has seen major changes in the market structure of the seed supply industry, with a major concentration of power. Many seed firms have been bought up by the biotech firms as a way for them to deliver their genes to the farmers through the seed. Farmers in industrialised countries no longer just buy this seed but also have to sign contracts forbidding them from doing a variety of things, including saving seed for reuse, and they are subject to inspection and, if found culpable, prosecution. While this is having considerable effects in industrialised countries (see Box 4) there are major concerns about the effects of an IP system in low-

Box 4. Percy Schmeiser vs Monsanto

Percy Schmeiser, a Canadian farmer, grew canola (oilseed rape) for more than 40 years. In 1998, Monsanto Canada Inc claimed that he had illegally planted "Roundup Ready Canola", a seed tolerant of glyphosphate herbicides, which was subject to a Canadian patent owned by Monsanto US. Monsanto Canada brought the case before the Federal Court of Appeal as a licensee. Monsanto claimed that Mr Schmeiser had not signed a "Technology Use Agreement" with the company, which gave farmers the right to grow the plants containing the patented gene, before growing it on 1030 acres.

Monsanto Canada claimed for: (i) $15,450 in general damages on account of land seeded for canola (at the rate of $15 per acre of land, which was in accordance with the terms of the Technology Use Agreement), (ii) $105,000 to be paid to the patent owner, Monsanto US (which was the value of the disputed crop), and (iii) $25,000 for punitive and exemplary damages.

Monsanto Canada based its claims on its investigations in the summer of 1997 through a private investigating agency. The agency undertook random audits of canola crops growing in Saskatchewan farms, including that of Mr Schmeiser's. This investigation indicated that "Roundup Ready Canola" was being grown on Schmeiser's fields, where it was not licensed.

Mr Schmeiser, in his defence, argued that he was using his own strain of canola and that his general practice was to use chemical herbicides as little as possible. He said that if his crop was found to contain the patented gene this was the result of contamination which had occurred for various reasons. These included: "cross field breeding by wind or insects, seeds blown by passing trucks, or dropping from farm equipment, or swaths blown from neighbours' fields". He lost his case but has appealed.

This case is a pointer to the nature of control that seed companies can exercise over farming activities using the leverage they obtain through IP protection. The nature of the rights plant breeders enjoy under UPOV'91 would make it easier for rights holders to exercise control over harvested material, and also products of the harvested material, if the rights holders claim that they are unable to exercise their rights over the infringing farmer, as Monsanto did in the Schmeiser case.

Source: Box based on box in Dhar op cit, fn 53

[68]Newby H (1979) Green and Pleasant Land? London: Wildwood House, p 103

and middle-income countries with a very different rural structure and where hundreds of millions of people depend on farming for their livelihoods[69]. Poor farmers in low- and middle-income countries do need innovations that will improve their livelihoods – by reducing their risks of crop failures and other growing problems, reducing labour bottlenecks through improved equipment and increasing productivity without exposing them to too much risk. The key question is how far the new global IP regime and the way it is implemented will help or hinder those needs. It seems unlikely that corporations will invest in the food problems of poor nations or poor sectors within those nations as their returns would be so marginal.

5.1 Farming's future?

The possible impact of the IP regime in agriculture can be envisaged by extrapolating from positions and views held at present. Perhaps the most likely scenario is for a global food system that is IP-protected and intensive-farming biotechnology led, with all commercially significant plants and animals genetically modified by major corporations. Plants and animals will be designed to meet the needs of large-scale food manufacturers, processors and retailers who increasingly supply urban markets globally and want large quantities of uniform supplies from large-scale producers.

A strong production focus with a narrow view of efficiency and a technology rachet effect as producers' margins are squeezed is likely. Smallholder farmers in developing countries are rapidly unable to maintain their livelihoods and forced to seek work elsewhere or migrate to towns and cities, causing major social upheavals. Some small-scale producers are left with niche markets but if these become substantial, then large-scale enterprises take them over or drive them out. Widespread use of modern varieties and GM crops, animals and cloning, produce areas of considerable uniformity further undermining agricultural biodiversity. Many plants and animals become tied to the application of proprietary chemicals to activate key traits. Farmers become less independent and are contracted only to grow specified plants and animals. Any reuse, replanting or further breeding will not be allowed without payment of fees. Patents gradually replace plant variety protection (plant breeders rights), as the biotech industry involvement in breeding expands and this prevents further research on their products by others. Small seed companies are bought up globally and a few major firms control seed production in every commercially important crop.

Commercial firms focus on protected seeds and animals, supplying to medium and large-scale enterprises, and the seed and breeds sector begins to resemble the pharmaceutical sector. Commercially unimportant crops and animals are left to the public sector to research to produce new varieties for farmers, while special deals for use of proprietary research tools and products for these crops are required. There is further reduction in both agricultural biodiversity and wild biodiversity, a decrease in *in situ* conservation, and little or no space for traditional farming systems unless they are able to supply niche markets.

Increasingly oligopolistic market structures dominate each of the sectors, with little room for small and medium sized enterprises (SMEs) and with any that become significant competitive threats being bought out and absorbed in large businesses. The market power of large firms, backed by advertising, pushes branded products onto consumers, limits labelling, and is resistant to local choice issues or concerns over processes by which food produced. The multifunctional values of farming in rural landscape, and livelihood issues are lost.

While much of this may be likely, it is not inevitable or, in our view, desirable There are alternatives, discussed in our earlier reports: building on the natural and social capital created in a wide variety of farming systems is possible and more sustainably viable[70].

5.2 More balanced incentives

The current IP regime provides incentives for innovation in the formal sector by commercial interests but fails to provide incentives for the sustainable conservation and use of biodiversity by farmers. "Intellectual property rights over life convey an asymmetric system of conserving, using, transforming, managing, and controlling biodiversity. This asymmetry is detrimental to many indigenous and peasant people, who are precisely amongst those most in need of biological innovation and who can best carry it out", argues Joseph Gari from FAO[71]. These are the people who should benefit from the CBD and the new ITPGRFA. Full implementation of these, especially the Treaty and its provisions on Farmers' Rights, should help counterbalance the present lack of incentives and rewards for them.

This also requires tackling the problems of biopiracy (Annex 1) so that PVP rules no longer allow varieties that have simply been discovered in one place to receive plant breeders rights in another. A larger challenge is to address a bias against work that would improve the livelihoods of poor farmers and build on their knowledge and experience rather than rapidly replace it with innovations likely to benefit fewer larger farms and promote more intensive techniques.

To meet such a challenge requires seeing an intrinsic value in, and the justice of improving, rural livelihoods, including those of poor farmers on marginal lands. But do national policy makers want to support their farming population? In many states there are often de facto policies which aim, or tend, to reduce numbers of smallholder farmers, a process which the more private sector, IP-based, approach will probably exacerbate in the future. If

[69]Kuyek D (2002) Intellectual Property Rights in African Agriculture: Implications for Small Farmers.GRAIN August 2002. www.grain.org/publications/africa-ipr-2002-en.cfm

[70]Pretty J (1998) The Living Land. London: Earthscan and Pretty J (2002) Agri-Culture: Reconnecting People, Land and Nature. London: Earthscan

[71]Gari J A (2001) Conservation, Use and Control of Biodiversity: Local Regimes of Biodiversity Versus the Global Expansion of Intellectual Property Rights in Perspectives on Intellectual Property 9 special issue on "IP in Biodiversity and Agriculture" p 23

smallholder farmers are squeezed out, as has historically been the case in the industrialised countries[72], unless there exist alternative livelihoods or there is deliberate adoption of policies that prevent them from being squeezed out, then they face destitution, forced migration and food insecurity. Given the vast differences that exist in countries, with farming populations varying from a considerable majority of the population to a small minority, a range of policy options is needed. These different approaches include enabling some households to leave farming, providing others with technologies to improve their efficiency and protect the natural resources they manage, and enabling others to become fully commercial farmers – depending upon the livelihood strategy[73]. And that will require any use of IP in agriculture to recognise the different circumstances and objectives, as the International Plant Genetic Resources Institute has noted (Annex 2).

IP is only part of a much bigger policy mix that affects the future of rural livelihoods and the type of farming practised. However, the arguments about them are relevant to understanding where IP fits. Some critics emphasise the need for a more participatory approach to technology development, with the support and involvement of smallholder farmers, and an agro-ecological approach to agricultural development in keeping with rural development needs. In this approach, biodiversity must be viewed broadly, the importance of *in situ* conservation and use stressed, and natural resource management strategies used to develop technologies with resource poor farmers that support the agro-ecological conditions[74]. Such critics see GMOs as a biologically dangerous and socially simplistic way of dealing with the complex realities facing smallholder farmers who have few resources other than knowledge of how to farm in difficult conditions. In their view, that knowledge needs to be nurtured supported and built on, rather than replaced.

Such critics also question the ability of the existing international and national research systems to deliver this. They argue that seeds encompass farmers' strategies for managing the land and risk. For example, farmers in the Andes use hedgerows as decentralised and farmer-managed *in situ* gene banks. Any seed introduction needs to be in keeping with the farmers' needs if it is not to destroy their management system. A broader understanding of agricultural biodiversity is required – it is not just the genetic resources but the wider range of species that support production (e.g. pollinators, predators, soil biota) and their agro-ecosystems as well as economic and social systems that go around them which need to be considered. One response to this in Peru seeks a non-IPR based way of safeguarding food security by creating a space for local communities to manage and develop their genetic resources – notably potatoes – within the framework of the traditional and indigenous knowledge and practices[75]. Another response, in India, seeks to have the small-scale innovations of farmers and small-scale entrepreneurs covered by IP, with their inventors receiving some rewards[76].

Current trends, however, seem more likely to lead to the rapid elimination of smallholder farmers and adoption of models of agricultural production similar to those in the USA and Europe, with few farmers linked into supply chains. Yet, as OECD regularly points out, the US and EU governments spend billions of dollars in various forms of subsidies to agriculture – but they generally fail to benefit small family farms which are continually squeezed out. In fact, the supports may do more to help maintain land values, high levels of input prices and larger enterprises. In the OECD area in 2000, total support to agriculture was $327 billion or 1.3% of GDP, of which support to producers accounted for 34 % of total farm receipts[77].

We recommend much greater flexibility in deciding whether or not to apply IP rules to food and farming and in the way in which any such rules are applied in order to safeguard smallholder farmers' interests and their farming systems. We also suggest a variety of ways are developed to ensure Farmers' Rights are met.

[72]Halwell B (2000) Where Have All the Farmers Gone? in World Watch, 13 , 5

[73]Tripp R (2001) Agricultural Technology Policies for Rural Development in Development Policy Review 19, 4 pp 479-489

[74]Altieri M & von der Weid J M (2000) Prospects for Agro-ecological natural resource management in the 21st Century Dresden: GFAR, Dresden http://www.egfar.org

[75]Field visit during Multistakeholder Dialogue Dialogue on Trade, Intellectual Property and Biological and Genetic Resources in Latin America, Cusco, Peru, 22-24 Feb 01, www.ictsd.org

[76]Honeybee network, www.sristi.org

[77]OECD (2001) Agricultural Policies in OECD Countries: Monitoring and Evaluation 2001 Paris: OECD

6. Citizens in communities and countries

The ethical issues raised by the global IP regime stretch far beyond agriculture. They include the ever thorny issues surrounding the acquisition, accumulation and distribution of property. "The most important expansion of the concept of property has been the creation of intellectual property. This has ancient origins but only in the 1990s did intellectual property regimes move to the centre of trade regulation and global markets", say John Braithwaite and Peter Drahos in their seminal work on global business regulation[78]. The various types of IP are a form of global business regulation today. They are a government intervention, in the interest of broader social goals, that favours some at the expense of others for what are deemed broader social goals. Key questions, then, are in whose interests do they operate, how fairly do they reflect the interests of society as a whole as against certain vested interests within it, and how democratically are the rules made which help shape people's lives?

When it comes to inventions or knowledge that lead to innovation in agriculture we all have an interest – human food security depends on farmers' continuing ability to produce sufficient, safe, nutritious, food in a sustainable manner from generation to generation. The question of the utility of IP to society as a whole is central. Drahos claims that "economic judgement on intellectual property rights ultimately has to be based on the outcome of a cost-benefit calculation…Without the cost-benefit approach intellectual property would remain an opaque institution…we would not know who the real winners and losers are when states, legislatures and judges shift the boundaries of abstract objects and draw new enclosure lines in the intellectual commons"[79]. We agree that the costs and benefits need to be made apparent but not that utility is the ultimate ethical basis for judgement, rather it is one of several. Clearly, if the costs and benefits can be apportioned, we can better make judgements about the justice of the outcomes arising from the use of these tools in agriculture, which are, anyway, supposedly designed for economic and social welfare goals.

6.1 Balancing private rights and public interests

TRIPS talks of a balance of rights and obligations (Article 7 see Box 5). But this cannot be viewed simply within the context of the Agreement itself but in the way the Agreement – and indeed other agreements dealing with IP - affects the overall balance of social and economic welfare in relation to our food future. TRIPS identifies IPRs as private rights. Yet the private rights of innovators or those investing in innovation protectable by IPRs have to be balanced by the overall public good of the whole of society and the environment that may be affected by these innovations.

Box 5. TRIPS Article 7 Objectives

"The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations"

There seems to be an assumption that innovation is intrinsically a good thing, irrespective of what or where it is. But is that the case? To draw an analogy – it is as though saying driving from London to Birmingham ever faster is a good in itself when in fact society places limits on the speed with which you may drive to reduce risks to other road users and the individual, and nowadays to reduce CO_2 emissions. Perhaps there is a case to guard against innovation without due care and attention, reckless innovation and even causing death or damage by innovation. This may be of particular relevance for the impact on traditional and indigenous communities, where inappropriate innovations may damage or even destroy them, rather than support them.

Current IP regimes, as an extension of an individualistic Western culture, generally make no allowances for the protection of communal rights and intergenerational innovation, which are the hallmark of many low- and middle-income country cultural traditions. Much more work is needed on appropriate reward and incentive systems for innovation in these systems, but this need not necessarily entail different forms of IP, although that is being investigated by an inter-governmental committee in WIPO (Annex 1E).

The correct balance of rights and obligations regarding IPRs is not achieved if:

- innovations are damaging (environmentally and/or socially),
- innovation is restricted or skewed by the implementation of minimum standards of IPP required by TRIPS, and
- costs will not be borne by the private interests promoting the innovation but by the public at large or certain sections, such as smallholder farmers or poor consumers.

One of the ways to ensure a balance comes from a

[78]Brathwaite J and Drahos P (2000) Global Business Regulation. Cambridge: CUP p 56

[79]See note 1 pp 7-8

broader context of rules and regulations. Some, such as competition and anti-trust rules aim to protect consumer interests by preventing abuse of the exclusive rights that IP bestows. Others, such as those still to be agreed in the biosafety protocol of the CBD on liability for any unforeseen damage caused by biological innovations (Annex 1) provide both environmental and economic safeguards. It may be worth developing the speed limit analogy to explain. Speed limits are imposed to reduce the numbers killed in accidents. When it comes to innovation in the food system, especially where there may be commercial pressures to introduce inventions as quickly as possible into farmers' fields without due regard for the long-term consequences, mechanisms to deal with these are surely needed.

Private industry has clearly seen the potential profitability of IP-protected biotechnological research and has invested heavily in it. Companies use IP-protected innovation delivered through seeds as a tool in a battle for market power. "Companies now seek protection through IPR in more countries than they did in the past in order to (i) expand their market share, (ii) prevent competitors from becoming active in those countries, or (iii) as a bargaining tool to negotiate favourable local agreements"[80]. In the absence, as is normally the case in most low- and middle-income countries, of a balancing competition, strict liability framework and use of full cost accounting (which is needed in industrialised countries too) to estimate the true costs of changes, then IP favours private pressures to innovate. This allows those promoting innovation to capture benefits, while possibly not having to bear sufficiently the cost of any adverse consequences from such innovation.

These are, then, issues for rule-making per se. IP is a social construction with social and economic consequences, not some kind of 'natural law' like gravity. It is crucial that these rules are inclusive of all interests, take into account effects on our needs for food and farming, and fit into a balanced set of broader rules. The way they have been developed and extended globally to date gives no confidence that they are. **We recommend that any IP rules must be balanced by the necessary anti-trust and liability regimes and full implementation of related agreements such as the International Treaty and the CBD's Biosafety protocol.**

6.2 Public goods and social benefits

We need to produce what are called global public goods through cooperative international action as an essential element in achieving sustainable human development[81]. Public goods have two basic properties – consumption by one person does not detract from that of another (it is 'non-rival') and it is impossible or very difficult to exclude an individual from enjoying the good (it is 'non-excludable'). Knowledge is non-rivalrous in the sense that those sharing it do not lose what they have and others gain – but it can be personally advantageous not to disclose some knowledge to others if by so doing you can benefit. In general, however, we benefit as human beings and as societies from sharing knowledge – that is fundamental to education. A problem in encouraging people to expand knowledge, it is argued, is the difficulty of them capturing the benefits from doing so without some form of support. This might be direct state action, eg by paying people to do research or make artistic creations, or indirect state action to create conditions in which knowledge producers can capture benefits from its production, eg, by introducing laws that give innovators some claim over the knowledge they produce, such as patents, copyright and other forms of IP[82]. Thus, knowledge becomes a form of impure public good – we allow some to exclude others from using it.

As we noted earlier, today the amount of public R&D in agriculture, and especially that aimed at farmers, is declining. Joseph Stiglitz, when he was chief economist at the World Bank, pointed out that "relying on the private sector for agricultural research is likely to result in under investment from the point of view of society" because only a limited number of profitable things will be researched. He also noted that this applied research relies on continued publicly funded basic research and has greatly benefited from past university and other public sector research.[83] In other words the public has and continues to subsidise, private R&D. The question of the principles underlying research arises – should it be driven by the expected consequences or by the freedom to pursue creative curiosity?

The further that publicly-financed research moves away from that usable by farmers, the more the only people who can capture its benefits are those geared up to do further research to turn fundamental ideas into applied research producing new practices and products of use to farmers. If this is left to the private sector, it will focus on those things most likely to generate returns and serve markets that can absorb those products and services. Poor farmers operating in marginal environments are unlikely to provide a significant market. Thus as a matter of public policy we are subsidising major corporations with R&D labs by doing the background work that only they can benefit from and not the kind of work that could be freely shared and developed by farmers. This raises questions about whether public R&D could focus on other areas of R&D and on types of R&D for crops/farmers that the private sector is not interested in, such as open-pollinated high yielding maize, or contract others to do so.

6.2.1 Options in international and national agricultural research

Agricultural research in which IP plays a major role is likely to become more complex, more costly and more legalistic. Already there does not appear to be enough money

[80]van Wijk J, Junne G, Cohen J I and Komen J (1993) Intellectual Property Rights for Agricultural Biotechnology – Options and Implications for Developing Countries. The Hague: ISNAR Research Report 3

[81]Kaul I et al. (eds) (1999) Global Public Goods: International Cooperation in the 21st century. Oxford: OUP

[82]Stiglitz J (1999) Knowledge as a global public good in See note 81. pp 308-325

[83]See note 52

going into public good agricultural research for development that benefits the poor, both in low- and middle-income countries and the IARCs, to sufficiently deal with the complexities. This reduces their capacity to use the latest research tools irrespective of the IP regime, which itself may further reduce that capacity. Current trends in agricultural research and IP are likely to exacerbate the situation unless action is taken both internationally and nationally by governments.

The challenges facing public good agricultural R&D are a sub-set of those facing public good R&D and the circulation of knowledge for development more generally. Maintaining and developing public good, pro-poor, R&D almost certainly requires a refocusing of the research agenda and a similar approach may be needed for food.

These concerns throw into question the appropriate balance between supporting corporate actors and supporting unincorporated individuals and communities. It may be time for a radical rethink of the nature of technology transfer – so it is no longer thought of as moving technology from one place to another but of nourishing the innovative capacity of communities and countries able to meet their needs. This should draw on the wealth of knowledge, ideas and experience of the smallholder farmers and communities involved in farming as well as from other places in the world. In effect, this is how agriculture has developed over millennia. A narrow focus on IP protected, 'big science' based R&D may miss many existing and potential innovations of major benefit to farmers[84]. Systems are needed to reward those who have nurtured and developed agricultural biodiversity and this is a crucial element of striking the balance between the users and owners of IPRs. If not, such farmers will have no future in a development paradigm based on capital intensive, large-scale farming, their livelihoods will be threatened and their food security undermined[85].

However the IP regime develops, mechanisms must be found to continue to provide global public goods and the first and foremost way of doing this is to make them freely available in non-exclusive ways that cannot be misappropriated. There may be lessons to be learned from the concern over the Human Genome Project, to ensure that data produced by that remained in the public domain. There are also clearly lessons to be learned from the patenting of DNA in relation to medicines. As the recent discussion paper from the Nuffield Council on Bioethics made clear, the current way the patent system is being used is inappropriate[86]. While, in this report, we take a broader and less sanguine view of the IP issues in relation to farming, we endorse the specific concerns highlighted by Nuffield and believe they have equal validity in the way the patenting of DNA is affecting our food future. **We recommend that the exclusionary element of patents, plant variety protection and other forms of IP is rethought for processes and products of importance to food production, with a view to providing a right to reward for use, if necessary, but denying the right to exclude others from using processes, products and knowledge necessary for food security.**

6.3 Market structures

The work of Nobel prize-winning economist Amartya Sen and others has shown that simply increasing food production, as occurred in the so-called Green Revolution, does not necessarily mean hungry people get fed and food insecurity for the poor is ended. If people's entitlements are to be met, the market and social structure in food and farming matter as well as lower prices and more food production. The growing economic concentration of biotechnology firms in agricultural development which are able to commercialise the results of research suggests the market structure in which private R&D operates will be particularly important. The implications of IPP for market structure and opportunities in rural and urban areas need to be considered. John Barton, Professor of Law at Stanford, identifies a number of concerns including[87]:

- Effects on increasing seed prices, which he expects to be in the 10s of percent not hundreds. However, this is a reason why public seed provision will be needed in countries with oligopolistic seed markets, where a few firms control most of the market, to provide alternative sources and types of seed for smallholder farmers.
- An increasing use of trade marks, patents and PVPs to protect major developed-world markets from competition is likely, as is an increased use of lawyers.
- Use of patent portfolios to restrict follow-on research by potential competitor and public sector bodies. This requires countries to ensure developing world researchers have a legal right to use such research.
- The need to counter oligopolistic tendencies through competition and anti-trust measures.
- The need to restrict broad patent claims and patents on fundamental innovation

Action on these is needed at a political level to shape the framework in which inventors, companies and farmers operate.

There is a 'scale issue' of who actually does private sector research – small and medium sized enterprises grounded in specific socio-economic contexts or multinational enterprises operating globally with local subsidiaries. Large companies tend to focus on projects that give minimum returns considerably larger than those required by small companies. Moreover, large firms are unlikely to introduce innovations that undermine major selling lines or activities, unless forced to do so. Companies may also, as discussed earlier, even use patents as a way of blocking

[84]de Solla Price D (1963) Little science, big science. NY and London: Columbia University Press, and note 70§

[85]Busch L Burkhardt J and Lacy L R (1991) Plants, power and profit: social, economic and ethical consequences of the new biotechnology. Cambridge Mass. and Oxford: Blackwell

[86]Nuffield Council on Bioethics (2002) The ethics of patenting DNA – a discussion paper. London: Nuffield Council. www.nuffieldbioethics.org

[87]See note 56

innovation: companies can buy patents, or patent technologies themselves, and then not use them (but prevent other people from using them) so as to block developments that would hinder their agendas.

Companies also tend to address problems that have a market for the solution, not necessarily those problems for people in most need, who because they lack money [effective demand] do not form a market for the solution as is the case for millions of farmers worldwide. As Ben Mepham has noted: 'features of the free market are that it responds to: wants rather than needs; to purchasing power rather than entitlement; and impulsively to transient influences (as revealed frequently on the stock markets) rather than with circumspection'[88].

The International Centre of Insect Physiology and Ecology (ICIPE) in Kenya, for example, has had great difficulty in finding finance and an entrepreneur to turn into a marketable product its patented product for insect control that costs one sixtieth of chemical control and might be of considerable local use. It has been told that the total market is too small and firms will not get a return on their investment[89]. Society as a whole, however, might benefit from such an innovation.

There must be a balance between public and private sector agricultural R&D leading to new techniques if there is to be a choice for farmers, with the public sector working on things the private sector will not – and so providing opportunities for farmers to have real choice in the improvements they adopt and use in developing their farming systems and securing their livelihoods. This requires active participation by farmers in helping to set public research goals, for researchers to produce things that poorer farmers can use and have access to the techniques they need in order to do so. Monitoring is needed of the impact of IP on research practices and options for researchers in developing countries and those working for them in the IARCs.

6.4 Effects on consumers

Although most of our focus has been on the effects of patents and plant breeders rights on farming, as these are likely to have the biggest impact on people in low- and middle-income countries never exposed to them before, there will be effects on consumers too. Other forms of IP also matter. Companies use a mix of them in their operations, as discussed earlier. There is an issue of scale – in that use of IP in general seems to favour the larger players which have the legal skills and financial resources to make the most use of its various forms. As food businesses try to serve global markets they will increasingly use trademarks, trade secrecy and databases. They are likely to use them to affect behaviour patterns as people respond to advertising and marketing which influence food habits. To date, the disquiet felt by many about the IP-protected, private sector-led GMOs has led many firms that focus on the UK consumer to reject GMOs in their supplies, which are being promoted by others at the production end. But this may well change, as the biotech companies begin to produce products tailored more to the needs of processors and distributors, or with new properties that can be used in marketing to consumers.

Since the IP regime plays a role in facilitating consolidation and the domination of the food system by large corporations from seeds to shops, further work is needed on this and how to provide a more diverse business environment – matters which affect both autonomy and fairness. **We recommend a food system-wide study of the uses and role of IPP and its effects on the system's operation, functioning and market structures and of how the rules on IPP affect the shape of R&D and are used in influencing consumer habits.**

[88]Mepham B (1996) Ethical analysis of food biotechnologies: an evaluative framework. In 'Food Ethics' ed. Mepham B. London: Routledge: London, pp 101-119

[89]Hans Herren (2000), Director of ICIPE, Dresden. Personal communication

7. Agricultural biodiversity in the environment

The various forms of IP are legal constructs that increasingly affect how we human beings treat plants, animals, micro-organisms and other living things and their future. Even in the CBD treaty designed to protect biodiversity, living organisms are not given any intrinsic value in and of themselves – but only in so far as they are seen as resources for us human beings. It is an anthropocentric, materialist vision of the world. As such, it is not one to which considerable numbers of people from different religious and philosophical viewpoints would subscribe.

Many opponents of patenting on life forms see this as an inappropriate extension of private ownership rights to resources that should be or were previously held in common. Some religious and cultural traditions regard the extension of patents to living organisms as intrinsically wrong. In particular, the claim to human invention in relation to living material violates the belief in a divine creator and that life is a gift - the shared inheritance of human kind. Many more people without a specific religious view appear to have a considerable sense of unease about animal biotechnology [90]. Patenting of life forms "marks a significant further step in the larger process of the commodification of life" and the "reduction of the value of life and nature to the merely economic"[91]. Yet current patent law in the US views DNA as just another chemical entity and sees nothing exceptional about patenting living things. Indeed our economic system today celebrates the turning of everything into a commodity for sale.

Others without fundamental objections to patenting life forms nonetheless have concerns about the consequences of the new IP regime on living organisms. One concern is that patents underpin developments in genetic engineering that risk disturbing a complex pattern of interrelationships in the natural world that we still only partially understand. Already the commercial breeding of varieties using PBRs and their widespread planting is having dire effects on agricultural biodiversity which has been created by the activities of diverse human communities over generations. "The main cause of genetic erosion in crops, as reported by almost all countries, is the replacement of local varieties by improved or exotic varieties and species"[92]. In a world threatened with increasingly variable and extreme weather events such as storms, floods and droughts, linked to climatic change, widespread application of IP-protected, less diverse crops may affect the sustainability of farming systems as well as farmers' and researchers' efforts to adapt to climatic changes. In a world dominated by IP and contract law and short-term economic interests in breeding we wonder if there will be sufficient flexibility and diversity for both farmers and researchers to respond to changing needs[93].

One question, then, is whether the balance of rights and obligations achieved in the current IP regime that helps underpin the application of biotechnology is such as to minimise any accidental damage (eg unforeseen consequences of biological innovations on ecosystem viability). This requires appropriate methods of risk management, adequate trials, monitoring and evaluation, and placing constraints on over-rapid deployment of technology without an adequate biosafety regime and liability regime to compensate for any such effects (or provide mechanisms to ensure food is available to do so).

Although much attention has been given to plants, there is widespread use of genetic engineering techniques with animals including fish where patenting plays a major role. This deserves more attention than it has received to date, before commercialisation of whole new ranges of GM animals begins[94]. According to a report for the European Commission, "The changing market structure with consolidation of firms involved in breeding – both plants and animals – is also leading to a loss of some species. One interviewee argued that industry consolidation can produce determined action against the conservation of genetic resources, using examples from the US. There were 480 genetic lines of poultry in US 15 years ago (meat, eggs, chicken & turkey) selected for all sorts of traits. Now 227 have gone and another 200 or so are at high risk. With company buy-outs, the number of companies involved is falling, and the lines are being destroyed as a company buys up another company, then slaughters/ destroys all their genetics, unless they are of short term use in the breeding programme so they can take over the clientele. This provides a cheaper way of gaining market share than seeking out IPRs worldwide."[95]

Widespread adoption of a narrow selection of varieties and monocultural cropping patterns – or animal production with the development of clones – "renders the entire crop susceptible to organisms that are pathogenic to those varieties"[96]. Thus diversity does have both a natural advantage in a changing world climate and strategic advantage in a hostile world. It is important for the well-being of both biosphere and people, and that agricultural biodiversity developed over millennia is worthy of being protected and sustained. It is a matter of intergenerational justice, fairness to those using them and the well-being of the biological resources themselves. **We recommend recognition be given to the intrinsic value of agricultural biodiversity and mechanisms be developed to maintain and develop this in all countries.**

[90]Macnaghten P (2002) Animal Futures: public attitudes and sensibilities towards animals and biotechnology in contemporary Britain in 'Animals and Biotechnology'. London: AEBC. Annex C

[91]See note 46. pp 229 and 231

[92]FAO (1998) The state of the world's plant genetic resources for food and agriculture Rome: FAO. p 33

[93]As, for example, more becomes known about gene transfer between GM crops and weeds. Holmes B. (2002) Dangerous liaisons in New Scientist 175 2358 - 31.8.02 p 38

[94]Noiville C (1999) in Farm Animal Breeding and the Law eds Neetson A-M et al. EC-ELSA project 4th Framework Programme. Utrecht, The Netherlands. pp 87-105

[95]CEAS Consultants et al (2000) Study on the Relationship between the Agreement on Trade-Related Aspects of Intellectual Property Rights and Biodiversity Related Issues for Directorate-General for Trade of the European Commission. p 94. http://europa.eu.int/comm/trade/csc/dcs_trips.htm

[96]Rogers P, Whitby S and Dando M (1999) Biological Warfare against Crops in Scientific American 280 6, p 66

7.1 Bioweapons

Another concern is over the deliberate use of biotech weapons aimed at disrupting agricultural production of specific groups or regions, expressed most recently by the International Committee for the Red Cross[97]. Sadly, so far in human history, it seems that many major developments in biology have been accompanied by attempts to see if they can be used to develop weapons[98]. Moreover, "all known biological weapons programmes about which there is publicly available information have included a concern with the military utility of offensive anti-crop biological warfare agents and munitions"[99] To avoid this requires conflict prevention, banning of such weapons backed by systems to prevent their development and use, and means of verification. It is in the verification area that questions have arisen over how far industry concerns over protection of their IP could impede controls to prevent the intentional use of biotechnology to inflict damage through the development and use of biological weapons by either states or terrorists.

The failure to agree a binding and effective verification protocol to the Biological and Toxin Weapons Convention at the end of 2001, which was precipitated by the USA, was a major blow to reducing the risk from biological weapons. Although there were many reasons for the final collapse, two were government concerns over the loss of national security information and US industry concerns, largely from the pharmaceutical industry, over snap inspections which might compromise commercial confidentiality of their trade secrets. In discussions on concluding a protocol without the USA, some European industries are concerned that they would have to be open to inspection and US industry not, and are unwilling to be so[100].

We recommend that all governments sign up to and implement an effective verification protocol to the Biological and Toxin Weapons Convention.

[97]'Act now' plea on bioterror threat in New Scientist (2002) 175 2362, 28.9.02, p 4-5

[98]See note 96 pp. 62-67

[99]Whitby S. Millett P and Dando M (2002) The Potential for Abuse of Genetics in Military Significant Biological Weapons in Medicine, Conflict and Survival 18 2, Apr-Jun 2002, pp 138-156

[100]Meier O. (2002) Verification of the Biological Weapons Convention: What is Needed Next? In Medicine, Conflict and Survival 18 2, Apr-Jun 2002, pp 175-193

8. Rethinking the rules

The complex nature of food and farming and their interactions with biotechnology and IP suggest that the minimum, 'one size fits all' set of TRIPS rules, despite any flexibilities, is inadequate to deal with the diverse needs of communities world wide. Indeed, although the USA supports a one size fits all in TRIPS, the US delegate at the first meeting of the WIPO IGC in May 2001 questioned whether 'a comprehensive, uniform set of rules at the international level to govern the use of genetic resources, traditional knowledge and folklore' was either possible or desirable. Since many farming communities are actively engaged in the development and maintenance of agricultural biodiversity, the same question should be asked about TRIPS. Already in relation to public health, special treatment has been given to developing countries to ensure the patent system does not inhibit the availability of essential medicines to fight deadly diseases in developing countries.

Article 8.1 of TRIPS allows members to "adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development, provided that such measures are consistent with the provisions of this Agreement". At the WTO Ministerial meeting in Doha in November 2001, in a separate Declaration on the TRIPS Agreement and Public Health, ministers noted that "the TRIPS Agreement does not and should not prevent Members from taking measures to protect public health". One of the central obligations of states is to ensure the food security of their people and food should be treated similarly to public health. This may be particularly relevant if R&D in the food system moves into a similar pattern to that in the pharmaceutical sector, which also has a problem in generating products that deal with the diseases of poor people[101].

8.1 Tinkering with - or changing - the system?

Some of the concerns about, for example, the effects of over-broad patents on innovation in agriculture can be addressed within the terms of TRIPS through strict definitional and examination criteria. Article 27.2 could be interpreted to exclude certain inventions from patentability as long as commercial exploitation of these inventions is also forbidden according to TRIPS. This might address concerns of people who do not approve of patenting life forms on moral, religious or customary law bases. Other issues, such as those concerning the length of protection would require changes to TRIPS.

Article 27.3(b) provides the most scope for revisiting the provisions, as such a review is mandated and has been highlighted in the Doha Ministerial declaration. However, this review has been deadlocked and would require significant movement among the members to achieve a consensus (see Table A1 in Annex 1). If, however, any interpretations or clarifications are made that acknowledge the special importance of food security and the need for differentiation in that area, linked as it is to nutrition which is specifically mentioned in Article 8, this review would be the place to do it.

The thrust of many of the concerns about the impact of IPP on food security, and the application of biotechnology, is that they will impede the development needs of the poorest people in many countries. Since food security is a crucial issue for development, and the Ministerial declaration clearly required members to 'take fully into account the development dimension' in their deliberations there should be space to do so.

Other options should also be explored to make the rules more suitable to the needs of agriculture and the biological sphere. A number of suggestions have been made, some of which would require the current international rules agreed in TRIPS to be changed. These include:

1. To remove all biological materials, including micro-organisms, from patentability and seek other reward systems to encourage innovations. This has been suggested by many governments, particularly from Africa, in the review of Article 27.3(b) of TRIPS.

2. To amend the terms and conditions for patentability to facilitate agricultural research for development. For example, Ismail Serageldin former chair of the CGIAR argued at the Global Forum on Agricultural Research (GFAR) that a number of options be considered[102]:

- patent length on research processes should be restricted to 5-6 years, by which time often new processes had been developed anyway, and which gave companies a head start;
- a flat fee should be set for use of the patented process after a fixed time so users cannot be held hostage by monopoly rights holders;
- a clip-art like toolkit of patented technologies (i.e. free for public use and easily obtainable) should be developed that would be freely available to public good national and international R&D in specific countries or for specific poor people's crops; or,
- declare certain regions as kinds of 'conservation areas' where the rights of patent holders are restricted or overridden for the greater public good.
- exclude basic processes from patentability.

[101]Correa C M (2001) Some Assumptions On Patent Law And Pharmaceutical R&D. Occasional Paper 6. Geneva: QUNO. www.quno.org

[102]See note 60

3. To develop a pooled resource base of patents in which rights holders agree to non-exclusive royalty free licensing of the patented process and products for specific purposes could be done in the existing legal framework. It would also need to include the tacit knowledge (or know-how gained by experience) required to utilise them for agricultural research. This might be done by creating some kind of organisation with many members pooling their patents or by encouraging individual companies to publish details of all the patents they hold on the web, and offer downloadable royalty-free licences for use in those jurisdictions where required, with minimum bureaucratic effort.

4. To create, for plant breeding, a compensatory liability regime, which involves an automatic licence for use by someone developing an innovation further. This denies the first inventor the right to exclude people from using the innovation. If someone used the innovation immediately, there would be a set compensation fee payable. This would not apply, however, if the follow-on developer waited a set time before using the innovation. Then the knowledge would be considered freely available in the public domain, as by then the inventor should have recouped any R&D cost through his exclusive use of the innovation or by receiving compensation from others who were using it. The first inventor would anyway have had to draw on the public domain for much of what lay behind their relatively small-scale innovation[103].

None of these will happen easily. They require substantial political effort to be achieved. And all have implications for the way TRIPS is implemented, interpreted and possibly amended in the future as well as for negotiation in other places, such as WIPO to ensure that these do not remove the flexibilities within TRIPS or the possibility of amending it.

In the meantime, regional groupings of countries could choose the strictest interpretation of many of the terms in TRIPS for patentability, such as exclusion of discoveries, strict definitions of the inventive step – and at the same time support their industries to take out patents in the key industrialised country jurisdictions on things not patentable in their own. If they did so, then they could do as the now industrialised countries once did. That is, take advantage of many processes and products, patented in other jurisdictions but not allowed to be in their own countries and develop trade in the products produced amongst themselves unhindered by current rules. This might seem only just and fair, and could provide one mechanism to achieve the technology transfer talked of in TRIPS. They would not be able to export to the jurisdictions with more lax rules, however, and may have more difficulty in joint venture and foreign direct investment (FDI) from firms in those countries. The key challenge for those with significant farming communities is in melding their knowledge, skills and aspiration with that from the more formal R&D sector to achieve greater food security.

We recommend that the existing rules are modified to differentiate between the needs of different sectors and countries in agriculture, so that, for example:

- **patent terms may be varied according to the subject matter and level of economic development**
- **the exclusionary element of patents, plant variety protection and other forms of IP is rethought for processes and products of importance to food production, with a view to providing a right to reward for use, if necessary, but denying the right to exclude others from using processes, products and knowledge necessary for food security**
- **broad patents on research tools and processes and copyright restrictions on basic information should be avoided.**

[103]Reichman J H (2000) Of Green Tulips and Legal Kudzu: Repackaging Rights in Subpatentable Innovation. Vanderbilt Law Review 53 6 Nov 2000

9. Conclusions and recommendations

Will the current, high level of IP protection make the world a better place with a safer, more sustainable, secure food supply, distributed in a just and equitable way? Looking, say, 50-100 years ahead, will the future be one where a few companies control the markets in plants and animals (including fish) in a similar way to those in energy, chemicals, film and other industries today? If so, will it matter? We believe profoundly that it will. We subscribe to what has been called the dungheap theory of power – gathered together, concentrated, it stinks; only when it is spread out and incorporated into the soil that is society does it fertilise all its members and empower them to blossom and be creative[104].

The full impact of a global IP regime will not become clear for many years, possibly decades. But it is likely to be profound – just as the rewriting of the IP rules in the late 19th century and related legal changes helped shape the economic environment in which future developments took place and laid the basis for the economic concentration of power we see today.

Patent law today represents the balance that society has struck between the principle of rewarding inventiveness in a competitive commercial culture and the principle of knowledge gained from research being freely available. However, as a result of increasing privatisation, scientific research seems to be shifting away from its traditional values of openness and discussion towards confidentiality and secrecy. As a result, the growing power of the corporate sector, together with the extension of patents to life forms, will tip an already unequal balance, and strengthen the power of corporate interests while further marginalising questions of human welfare and social justice. **Some groups advocate a complete rethinking of the way innovation is promoted in agriculture and the life sciences. We support this.**

As the Church of Scotland SRT Project has argued, a democratic deficit is developing in our increasingly globalised society, where momentous decisions which could alter the whole future course of humanity are taken in fora which are outside democratic control. Slowly, however, there is emerging a growing pressure from a broadening range of groups to rethink the current regime, troubled as it is by a whole range of ethical concerns over the extension of patents to lifeforms, their impact on food and biodiversity, and the way in which these international agreements are arrived at. Debate and examination of these issues should be encouraged and one response should be to create local citizen juries to discuss / debate issues in IP.

Perhaps the single most important conclusion to draw from looking at the current IP regime and its global expansion is that there is a danger of us sleepwalking into a new set of relationships that will not, in the end, deliver the social and economic benefits they are supposed to. Some forms of IP clearly are 'winner takes all' and it is naïve to talk of 'win-win' situations because inevitably some people lose, while others gain.

There are a number of possible responses to the current situation. One is a resigned acceptance with any remedial action being limited to an attempt to mitigate any major problems for specific groups. This amounts to seeing the WTO as all powerful, the TRIPS rules as fixed and the vested interests as too great to shift. Another response is to reject the whole idea of IP in agriculture and to seek to return to the, quite recent, situation where it played little or no part. A third response is to admit the possibility of such a change to an IP free situation, while seeking the greatest use of existing flexibilities and making amendments to existing rules to better suit the needs of agriculture. This latter option will entail monitoring the effects and being willing and having the capacity to amend or revoke the rules if necessary. We prefer a combination of the last two and **we recommend introducing special and differential treatment of IP for food and farming in low- and middle-income countries based on their particular social and economic conditions.**

Our aim in this report has been to alert readers to the range of issues involved and encourage a greater debate about this as a step towards dealing with them and avoidance of a resigned acceptance of the status quo. As such we have focussed more on providing a background and outline of issues and only wish to frame general recommendations at this time. More specific proposals are contained in many submissions to the TRIPS Council, and listed in Annex 1, and in the recent report of the Commission on Intellectual Property Rights, set up by the UK Government.

9.1 Make rulemaking more just

The first point to stress when it comes to IP is that we, as societies, make up the rules – and we can remake them. There is absolutely nothing that is 'natural' about IP. Moreover, the recently created minimum one size fits all approach is inappropriate and should be amended.

One problem is the undemocratic and self-interested nature of the rule making in this area. As the Bellagio declaration concludes "…laws of intellectual property, as well as laws of neighboring and related rights, have been designed by a few individuals and applied to many. The goal of a just world order of intellectual property may be best advanced by addressing the process by which intel-

[104]See note 9 p 230

lectual property laws are made and revised, to provide more representation for interests other than those of governments and information industries - through the inclusion of more non-governmental organizations and community groups in the dialogue"[105]

This suggests that in reviewing and revising international agreement such as TRIPS in relation to food, and in implementing the provisions of other agreements that affect the future of our food such as the CBD and IT PGRFA, primacy should be given to the need for flexibility in rules and adaptation to the needs of farmers and citizens rather than the vested interests of lobby groups and export industries. Their effects should be monitored and, if necessary, the rules changed or abandoned if they adversely affect the food providing capacity of the biosphere.

In the interim, something similar to the declaration on TRIPS and Public Health is needed. This will entail abandoning the pressures from developed countries to strengthen IPP in developing countries beyond the present requirements. Also needed is a substantive review of the provisions of article 27.3(b) of the TRIPS agreement which permits the changes being urged by the developing countries at least as options in the jurisdictions that wish to adopt them and without having to trade off concessions in other areas.

It is simply not acceptable to look at rule making in a narrow context. Rule making is not some self-contained and consistent process: it is not a fair process. It involves very unequal players, processes that are in themselves inequitable, systems that require trade-offs for things that should not be traded as they are incommensurate, and coercive bargaining relationships[106]. Ways must be found to ensure that powerful countries do not simply exploit other means to gain what they have been unable to do in the WTO.

9.2 Support public good R&D and equitable market structures focussing on the needs of smallholder farmers and poor consumers

We believe the public sector must ensure, in the interests of distributive justice and social well-being, that a suitable balance is struck so that the interests of poor people and farmers in disadvantaged areas are not neglected. This means recognising that markets work and markets fail – the latter especially when it comes to meeting the needs of those without effective demand. Governments have a responsibility to ensure the needs of the poor are met nationally and collectively as an international community. Action may be needed, for example, to avoid economic concentration of market power in the seed and breeding industries, which is fuelled by the IP regime.

The links between research and development should also be re-examined. It may be that better results for the poor can be achieved by ensuring that research findings and inventions leading to new processes are kept separate from development activities. Exclusive rights over these processes should not be given but they need to be made widely available for the greatest public good– and competition encouraged in the application of these processes, not giving the inventor control over them and excluding others from their use. It is inappropriate, for example, for the IARCs to adopt the US reading of patents, especially if the countries they work in do not share it. Thus, the language and tenor in Material Transfer Agreements should not be linked to a US understanding of patentability, especially dealing with countries where a particular US patent itself may not be in force or even obtainable under their interpretation.

Public good R&D for farming, which redresses the unbalanced focus on private sector, IP-protected biotechnology based research, is needed – directed to the farming communities. More work too is needed to understand how other forms of IP, which more directly affect consumers, are used by the main actors and, in particular, how they affect nutrition and the well-being of the poor.

9.3 Recognise the value in agricultural biodiversity

In our view, living organisms have intrinsic value, beyond the instrumental value which is of use to human beings. There is also value in maintaining and building on the huge range of agricultural biodiversity developed by farmers over the millennia which is in danger of being lost. Urgent attention is needed on the impact of IP rules on the future of animal breeding, maintenance of the existing range of breeds and their future viability. Given the importance of *in situ* and on farm conservation and development of genetic resources for food and agriculture, the CBD and ITPGRFA should be fully implemented to safeguard them and the traditional and indigenous communities who maintain and develop this agricultural biodiversity should be encouraged to flourish.

9.4 Move beyond coercive bargaining

TRIPS does allow countries to use the flexibilities and ambiguities within it to suit national needs and not simply follow one country's interpretation and practice of those rules. Achieving an understanding of where there should be changes in future as the rules are reviewed and having the negotiating strength and capacity to get those changes is also needed, as well as the capacity to follow and ensure that activities in other fora and places do not contradict these aims. Particular attention should be paid to the work in WIPO on patent harmonisation which, as the CIPR report points out, must not be allowed to undermine the

[105]See note 6 p 199

[106]Drahos P (2002) Developing Countries and International Intellectual Property Standard-Setting London: Commission on Intellectual Property Rights and see note 78 Ch 24

flexibilites countries need to adopt or not, as they decide, levels of IP protection that are appropriate to their agricultural and general development needs.[107]

While the TRIPS Agreement lays down certain minimum standards it allows countries considerable flexibility to interpret the meaning of the words used. This is in keeping with the understanding that patents are territorial and it is up to each country to determine the details of its own patent law. Legally, if countries have been or are obliged to adopt interpretations stricter than they would otherwise wish, or that go beyond those outlined in TRIPS, this would be in breach of Article 1 of TRIPS, which states "Members may, but shall not be obliged to, implement in their law more extensive protection than is required by this Agreement, provided that such protection does not contravene the provisions of this Agreement. Members shall be free to determine the appropriate method of implementing the provisions of this Agreement within their own legal system and practice."

In reality, however, many countries may have no choice but to agree to higher IP standards than in TRIPS or specific interpretations in order to gain trade preferences or otherwise make bilateral agreements with the USA or EU on other issues. After complaints from NGOs about EU pressures in its bilateral negotiations with low- and middle-income countries to adopt TRIPS plus legislation, the Trade Commissioner agreed that the EU would not require, as part of the terms for other agreements, that countries adopted levels of IP protection in excess of those in TRIPS[108]. However, many bilateral and regional agreements with the USA do require this[109]. Countries should be free to develop their own *sui generis* system for PVP if they wish and not be pressured into adopting UPOV. They also should have the technical support needed to develop such *sui generis* systems from organisations they feel confident will act in their interests.

9.5 Adopt a new language – from IPRs to IMPs

In general, we suggest it is time to change the language we use about IP. The generally used generic term of intellectual property rights (IPRs) masks the different nature and origins of the various forms of IP, and conflates ideas and justifications that might be appropriate for one, such as copyright, with another, such as patents. For if, as Drahos suggests "The privilege that lies at the heart of all intellectual property is a state-based, rule governed privilege to interfere in the negative liberties of others[110]" then as a way of changing our understanding of them we should use language that more accurately reflects what they are. We concur with his suggestion that "the language of property rights would be replaced by the language of monopoly privilege. The grant of these monopolies would be tied to the idea of duty. Duty-bearing privilege would form the heart of an intrumentalism in intellectual property[111]" Thus the term, intellectually-based monopoly privileges (IMPs) would more accurately reflect what they are, if indeed a generic term is needed – privileges granted by society to a few to exclude the rest, which can enrich the few, in the name of producing things society wants or as a means of rewarding their creativity. Such a change in language can help in restructuring the debate about the kind of IP system and rules we want, whom we want to benefit and the range of things we want them to cover. It will help regain sight of the social contract that lies behind IP policy, which is essential in food and farming.

This will not interfere with real human rights – inalienable, unassignable - such as the right to life – and food. These human rights cannot and should not be given to corporate bodies – as these themselves are inventions of the state/society. Yet increasingly today, the various forms of IP are simply a tool in the battle for market power, where individuals no longer benefit from the IMPs they are supposed to benefit from.

[107]See note 5, Ch 6 & 8

[108]Oxfam International Seminar (2001) What Future for the WTO TRIPs Agreement., Brussels, 20.3.01

[109]Drahos P (2001) Bilateralism in Intellectual Property., Paper Prepared for Oxfam http://www.oxfam.org.uk/policy/papers/bilateral/biltateral.rtf

[110]See note 1 p 213

[111]See note 1, p 223

Annex 1: The institutional mix

A. The Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS)

The TRIPS Agreement provides minimum national standards for levels of protection to the creators of intellectual property in the following areas:

- copyright and related rights;
- trademarks;
- geographical indications;
- industrial designs;
- patents (and plant variety protection or PVP);
- layout-designs (topographies) of integrated circuits;
- protection of undisclosed information; and,
- control of anti-competitive practices in contractual licences

Unlike other WTO Agreements, the only special and differential treatment for low- and middle-income countries in TRIPS concerns the timetable for implementation. While developed countries had to implement TRIPS within one year of entry into force of the Agreement, these countries had an extra four years - i.e. until 1 January 2000. A similar delay applied to economies in transition (from centrally-planned to market economies) and least developed countries have a 10 year transition period but they may apply for extensions and so could delay implementing TRIPS if they wished. Newly acceding members of the WTO generally do not benefit from the transitional arrangements.

A1 Patents

Three sub paragraphs in Article 27 permit exceptions to the basic rule on patentability:

• When members want to prevent the commercial exploitation of the invention to protect *ordre public* or morality; this explicitly includes inventions dangerous to human, animal or plant life or health or seriously prejudicial to the environment (Art 27.2).

- Diagnostic, therapeutic and surgical methods for the treatment of humans or animals (Art 27.3(a)).
- Article 27.3(b) permits WTO Members to exclude from patentability:

"plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement"

The language of this exception is deliberately complex and continues to be subject to interpretation and legal argument over its meaning[112]. Members may also provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties (Art 30).

Patents must also be available and patent rights enjoyable without discrimination as to the place of invention and whether products are imported or locally produced - the so-called 'national principle' (Art 27.1). According to Article 28.1(a) of the TRIPS Agreement, patents relating to products confer the right to prevent third parties from 'making, using, offering for sale or importing for those purposes the product' without the patentee's consent. This last point is important for agricultural trade. If something was allowed to be patented in the USA, say, but which was not patented elsewhere, then the US patentee could block imports of that product unless royalty payments were made. This has happened in a number of cases, for example with a patent on yellow beans, and given rise to considerable controversy[113].

In the case of process patents, the patentee may prevent the use of the process as well as the commercialisation of a product 'obtained directly by that process'. Thus, if a process to produce a plant (e.g. by genetic engineering) is patented, exclusive rights would also apply with respect to the plants obtained with the process. Article 34.1 also places the burden of proof in process patents on the producer to show that it is not being produced by the patented process.

A1.1 Article 27.3(b)

The terms used in Article 27.3(b) are not defined in the TRIPS Agreement. This means there is scope for individual national interpretations and protracted legal wrangles are likely to determine which ones will prevail. The words open to interpretation are: plants, animals, micro-organisms, essentially biological processes, non-biological, microbiological, plant varieties, effective, and *sui generis* system. These disputed words are defined differently in different international and national legislation.

Currently, patenting principles and practices on

[112]See Tansey G (1999) Trade, Intellectual Property, Food and Biodiversity: Key issues and options for the 1999 review of Article 27.3(b) of the TRIPS Agreement, London: Quaker Peace and Service, for a more detailed discussion of this issue available on www.quno.org

[113]Action group on erosion, technology and concentration. http://www.etcgroup.org

Table A1. Some proposals made in TRIPS Council for the review of Article 27.3(b)

Low and middle income countries (either individually or in groups)

General	On life patenting	On *sui generis* system
Extend the transition period for implementation Extend review and after completion allow an additional five year transition period	Exclude patents on all life forms; or - at least exclude patents based on traditional/indigenous knowledge and products and processes essentially derived from such knowledge. Extend the exclusion for essentially biological processes to microbiological processes	Retain flexibility for members to decide on the most effective system. UPOV is not the only reference to fulfill the criterion of effectiveness Must be flexible enough to suit each country's seed supply system
Harmonise TRIPS with CBD: • by requiring information on providers of genetic resources and countries of origin of biological material under TRIPS Art. 29, or • by incorporating a provision that patents inconsistent with CBD Art. 15 must not be granted Include provisions to: • promote, not undermine, the conservation and sustainable use of genetic material • prevent bio-piracy and • ensure appropriate returns to traditional communities.	Retain flexibility for members to exclude plants and animals. • leave to national policy decisions on what are patentable microorganisms, including in light of Art. 27.2 (morality and *ordre public*). • allow members to require further conditions for patentability, viz (1) identification of source of genetic material; (2) traditional knowledge used to obtain that material; (3) evidence of fair and equitable benefit-sharing; and (4) evidence of prior informed consent for the exploitation of the patent. • clarify that discoveries or naturally occurring materials are not patentable • provisions on patenting of microorganisms should only apply to genetically modified microorganisms.	There are various ways to develop an effective *sui generis* system and no reason why countries cannot develop their own models. Include protection of indigenous knowledge and farmers' rights What is an effective *sui generis* system may be best left to each Member to evolve in its legal system and practice. Ensure that the preservation of Farmers' Rights is not considered a dilution of effectiveness of the system.
Introduce mandatory system of IPR protection for traditional knowledge of indigenous and local communities, based on the need to recognise collective rights	Do not permit any further strengthening of the protection presently provided to life forms.	

Industrialised countries (either individually or in groups)

General	On life patenting	On *sui generis* system
Avoid overly complex requirements which oblige patent applicants to provide: • an official certificate of the source and origin of the genetic material and the related traditional knowledge used, • evidence of fair and equitable benefit sharing and • evidence of prior informed consent from government or local communities for the exploitation of the subject matter of the patent.	No lowering of standards of protection No extension of transition periods Consider whether a provision on the disclosure of the origin of genetic resources should be inserted in the TRIPS Agreement to ensure a more effective implementation of the CBD The exclusion for plants and animals is a balanced provision that takes into accounts members' needs and interests. Eliminate the exclusion for plants and animals so that they must be patentable in all countries	A system under the UPOV Convention is an effective *sui generis* system The proper balance between breeders' rights and farmers' rights will be solved by adopting a UPOV system There should be flexibility with regard to the implementation of the *sui generis* option to allow for effective benefit sharing with indigenous and local farming communities. The UPOV system is a useful reference for the basic level of protection of any *sui generis* system for the protection of plant varieties, but there may be other *sui generis* systems that meet the requirements of Article 27.3(b) Incorporate UPOV 91 into TRIPS An effective *sui generis* system would: apply to all varieties in the plant kingdom; apply to varieties that are new, distinct, uniform and stable; grant rights only to breeders; grant rights of at least 20 year duration; prevent others from commercialising protected varieties without authorisation; etc.

Source: edited from table compiled by GRAIN, http://www.grain.org/publications/trips-countrypos-en.cfm

biotechnological inventions are still in a state of flux, including in those countries that have already gained experience in patenting genes, according to Prof Carlos Correa[114]. Where it is allowed, 'the patenting of genes at the cell level extends the scope of protection to all plants which include a cell with the claimed gene', he says. Generally speaking, patents give patentees the right to prevent any commercial use of the materials, including for research and breeding purposes. This could threaten commercial breeding, especially with broadly drafted patents, for example, those which seek rights over processes used in any species. Unduly broad patents, however, should not be granted and, if they are, may be revoked following successful legal action.

WTO Members may provide limited exceptions to the exclusive rights conferred by a patent (Art 30). This provides some flexibility in drafting patent legislation and may allow Members to include exemption for research and breeding purposes. WTO Members are also free to determine what 'invention' means and many developing countries, including Argentina, Brazil and the Andean Pact countries, 'exclude the patentability of materials found in nature, even if isolated therefrom', notes Prof Correa. Other areas of flexibility are in how novelty and inventive step are interpreted and the scope of claims that will be admitted.

Many proposal have been submitted for the review of the provision of Article 27.3(b) and these are collated in Table A1. There is no agreement in sight, however, at the time of writing.

A2 Plant variety protection

TRIPS requires WTO Members to introduce either patents or a *sui generis* system of PVP or both. A *sui generis* (of its own kind) system of protection is a special system adapted to a particular subject matter, as opposed to protection provided by one of the main systems of intellectual property protection, e.g. the patent or copyright system. A special law for the protection of integrated circuits is an example of a *sui generis* law. In this case, it means countries can make their own rules to protect new plant varieties with some form of IP provided that such protection is effective. The Agreement does not define the elements of an effective system. In the last resort it is likely to be the Appelate Body of the WTO Dispute Settlement Procedure which will interpret the provision under the procedure for the settlement of disputes .

In most jurisdictions except the USA and more recently in Europe, plant varieties cannot be patented but as noted above genes can be and in effect lead to plant patents. It was because of their objections to patenting that the Europeans developed an alternative for plant varieties, plant breeders rights (PBRs), which became embodied in the International Union for the Protection of New Varieties of Plants (UPOV after its French title)[115]. This has now been adopted by the industrialised countries, and is also being adopted by an increasing number of developing countries. The Europeans developed PBRs because plant breeders found it difficult or impossible to meet two of the fundamental requirements of patent law: inventiveness, and a written description of how to make and use. The UPOV system, however, produces a quite strong IP regime for plant varieties geared to institutional breeding, which may not suit all countries. There is pressure now for patents to be extended to plant varieties as well as PVP, and for PBRs to become more patent-like in their conditions.

Under patent law there is no farmers exemption to allow the use of farm-saved seed as allowed for in UPOV (see Table A2). The International Plant Genetic Resources Institute (IPGRI) notes that "Breeders and modern biotechnology companies often perceive the farmers' exemption as potentially reducing the profit, or the expectation of profit. Consequently, there may be strong opposition on the part of breeders and modern biotechnology companies to this exemption in countries where patent-like protection for plant varieties is being considered"[116]. IPGRI also says "There is not one ideal *sui generis* system that will suit the needs of all countries".

B. The Convention on Biological Diversity (CBD)

Briefly, the CBD's three objectives are:

- the conservation of biological diversity;
- the sustainable use of its components; and,
- the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources[117].

The Convention brought genetic resources formally under national sovereignty. It requires countries to take measures to ensure the above and made access to these resources subject to prior informed consent – of the state rather than the community involved. And it envisages a series of bilateral deals to do so. However, the CBD developed from a mentality which equated riches to be found in compounds in plants with minerals in the ground. Some developing countries felt they had undervalued wild biodiversity of use to developed countries and industries, such as pharmaceuticals, which had been making use of them in patented products bringing enormous returns. Indeed, some accuse companies in industrialised countries of 'biopiracy' – arguing against the way they acquire resources and traditional knowledge from developing countries, use them in their R&D programmes, and acquire patents and other IPRs on products developed, all

[114]Correa C M (1998) Access to plant genetic resources and intellectual property rights. Rome; FAO - CGRFA http://www.fao.org/ag/cgrfa and Correa C M (2000) Intellectual Property Rights, the WTO and Developing countries – The TRIPS Agreement and Policy Options London: Zed Books and Penang: Third World Network

[115]See note 53

[116]IPGRI(1999) Key Questions for decision makers. Protection of plant varieties under the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights Rome: IPGRI p 10-11, see also note 53, and note 114

[117]The CBD uses the following definitions: **Biological resources** includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity. **Genetic resources** means genetic material of actual or potential value.

Box A1. Biopiracy – the misappropriation of Traditional Knowledge

"Bio-piracy through IPRs has arisen as a result of the devaluation and invisibility of indigenous knowledge systems and the lack of existing protection of these systems. The protection of indigenous knowledge systems as systems of innovation and the prevention of piracy of biodiversity requires a widening of legal regimes beyond the existing IPR regimes such as patents"[120]

"Bio-piracy" has been defined as the process through which the rights of indigenous cultures to genetic resources and knowledge are "erased and replaced for those who have exploited indigenous knowledge and biodiversity"[121]. In fact, a large number of patents have been granted on genetic resources and knowledge obtained from developing countries, without the consent of the possessors of the resources and knowledge. There has been extensive documentation of IPP being sought over resources "as they are", without further improvement (eg, US patents on quinoa, a food grain from the Andes granted to researchers of the Colorado State University, and another on ayahuasca, a sacred and medicinal plant of the Amazonia) and on products based on plant materials and knowledge developed and used by local/indigenous communities, such as the cases of the neem tree, kava, barbasco, endod and turmeric, among others[122].

Many of these patents have been revoked by the competent national authorities. The Council of Scientific and Industrial Research (CSIR) from India asked for a re-examination of a US patent granted for the wound healing properties of turmeric. The US Patent and Trademark Office (USPTO) revoked this patent after ascertaining that there was no novelty; the innovation having been used in India for centuries. In early 2000, the patent granted to WR Grace Company and US Department of Agriculture on neem was also revoked by the European Patent Office on the grounds of its use having been known in India. A reexamination request for the patent on Basmati rice lines and grains granted by the USPTO was also made by the CSIR[123].

The US government says:

"Informal systems of knowledge often depend upon face-to-face communication, thereby limiting access to the information to persons in direct contact with one another. The public at large does not benefit from the knowledge nor can the knowledge be built upon. In addition, if information is not written down, that information is completely inaccessible to patent examiners everywhere as prior art when they are examining patent applications. It is possible, therefore, for a patent to be issued claiming as an invention technology that is known to a particular indigenous community. The fault lies not with the patent system, however, but with the inaccessibility of the knowledge involved beyond the indigenous community. The US patent granted for a method of using turmeric to heal wounds, referred to during India's intervention in June 1999 and again in October 1999, is an example of a patent issued because prior art references were not available to the examiners. In that instance, however; the patent system worked as it should. The patent claim was cancelled based on prior art presented by a party that requested re-examination"[124].

However, as Alex Wijeratna from Action Aid reportedly said "It is very expensive to oppose patents in this way. Litigation and similar actions favour the rich at the expense of the poor."[125]

Box adapted from Correa C M (2001) Traditional Knowledge and Intellectual Property – Issues and options surrounding the protection of traditional knowledge. Geneva: Quaker UN Office, available on www.quno.org (Geneva pages)

without compensating (compensatory justice) the provider countries and communities (Box A1).

In the CBD, which the USA has signed but not ratified, members agree to undertake to provide and/ or facilitate access and transfer of technologies to other parties under fair and most favourable terms. Such technologies include biotechnology and others "that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the environment". Access to such technologies must be "on terms which recognise and are consistent with the adequate and effective protection of intellectual property rights". Yet the parties to the treaty should also cooperate to ensure that patents and other forms of IP "are supportive of and do not run counter to" the CBD's objectives. This reflects disagreement about whether or not IPRs support the CBD's objectives, and implicitly accepts that conflicts may well arise between the IP regime and the CBD.

But for agriculture, the resource-mining, 'winner-takes-all' mentality of the CBD pays scant attention to the unique nature of agricultural genetic resources. These have been developed by generations of farmers, exchanged and mixed up around the globe for millennia. Indeed, 'wild' biodiversity rich countries like Brazil, which is strongly pro-CBD, are agriculturally biodiversity poor, depending for 95% of their food production on crops that came from elsewhere. Many of the varieties and breeds developed over millennia and giving rise to much agricultural biodiversity are threatened today[118].

A Biosafety Protocol to the CBD was negotiated, with difficulty, to deal with cross-border movements of what it calls living modified organisms (LMOs). Liability was one of the most strongly contested issues in these negotiations and finally a clause that was a fudge was agreed to allow an overall agreement to be reached:

"Article 27 Liability and redress: The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first meeting, adopt a process with respect to

[118]See note 92

[120]Shiva V, Jafri A, Bedi G, and Holla-Bhar R (1997), The Enclosure and Recovery of the Commons. New Delhi: Research Foundation for Science, Technology and Ecology p 30

[121]See note 120 p 31 and note 5, ch 4

[122]Mooney P R (1998) The Parts of Life. Agricultural Biodiversity, Indigenous Knowledge, and the Role of the Third System. Uppsala: Development Dialogue, Special Issue

[123]Mashelkar R A (2000) The Role of Intellectual Property in Building Capacity for Innovation for Development: A Developing World Perspective New York: WIPO, WHO Panel Discussion Some cases of misappropriation under PBRs of varieties obtained from IARCs were also reported in Australia

[124]US General Declaration to the First Meeting of the WIPO Intergovernmental Committee on Traditional Knowledge, Genetic Resources and Folklore, Geneva, 1.5.01

[125]Cited in Wild J (2002) The future for patents on life. Derwent IP Matters http://www/derwent.com/ipmatters/features/jof_wild2.htm

the appropriate elaboration of international rules and procedures in the field of liability and redress for damage resulting from transboundary movements of living modified organisms, analysing and taking due account of the ongoing processes in international law on these matters, and shall endeavour to complete this process within four years".

It is up to individual countries to decide on their own internal liability regimes for nationally developed and used LMOs. The various approaches are being surveyed to provide a background for discussion on this provision. Some African countries have proposed rules on transborder movements that foresee strict liability, compensation and restitution as far as possible should there be damage. These were based on the rules developed by the International Law Commission.

This area is full of thorny questions – on the areas covered by the liability regime – the environment, eg damage to biodiversity, and human health; how to define the damage; who is liable – importer, exporter, producer. Where does responsibility lie – with the developers or, if they have followed state approved regulatory procedure, then is it the state? Also the time that might be needed before subtle but damaging effects emerge may make attribution of cause difficult – so what, if any should be the period of limitation for any liability – 30, 50, 100 years or what? However, LMOs for pharmaceutical use for humans are not covered by the Protocol. This may be important as attempts are made to use crops as producers of vaccines for humans – as controversy exists over their potential to cause environmental damage[119]

C. The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

After the CBD came into force, members formally recognised that the special needs of plant genetic resources for food and agriculture required distinctive solutions, and at a subsequent Conference of the Parties (COP) supported the renegotiation of the existing International Undertaking on Plant Genetic Resources for food and agriculture (IU) at to bring it into harmony with the CBD under the auspices of the Food and Agriculture Organisation of the UN (FAO). The IU was premised on germplasm of food and agricultural crops and forages as a common heritage of humankind which, to be safeguarded and developed, needed to be shared for everyone's benefit. It also recognised that most PGRFA is the result of germplasm development in multiple countries and continents. For example, maize originated in Mexico but has subsequently developed in all parts of the world. The renegotiations took over seven years and finally led to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) agreed in Rome at the FAO conference in November 2001.

The Treaty covers all PGRFA but for a limited number of some of the most important crops and forages for food security and interdependence, creates a mechanism that recognises the multi-country origins of these resources and so avoids the high and almost impossible to calculate transaction costs involved in bilateral agreements for the exchange of breeding material for food crops. It establishes a multilateral system to facilitate access and benefit sharing for some the most important crops and forages for food security - some 35 crop genera and 29 grass and forage species, which together account for about 80% of the dietary energy of the world's population. It aims to facilitate exchange of these materials through this multilateral system which will use a standard material transfer agreement (MTA), a special form of agreement as required by the CBD for any genetic resource exchanges. Such exchanges are a necessity for future breeding work by scientists and farmers. The Treaty also includes the *ex situ* collections of the International Agricultural Research Centres (IARCs) belonging to the Consultative Group on International Agricultural Research (CGIAR). The Treaty could be a model for further agreements to cover other genetic resources for food and agriculture e.g. livestock, as many breeds have been lost and others are threatened with extinction.

The Treaty includes provisions on IPRs in Articles 12 and 13. It declares in article 12.3 d) that "Recipients shall not claim any intellectual property or other rights that limit the facilitated access to the plant genetic resources for food and agriculture, or their genetic parts or components, in the form received from the Multilateral System". However, should any germplasm be taken out of the MLS through having patents taken out on it then this would create a loss to society as a whole that should be compensated by payment into a fund to promote the use of genetic resources. Considerable work remains to be done to determine exactly how these provisions of the treaty will be implemented and what proportion of royalties should be returned to the funding mechanism.

This is true also for Farmers' Rights, which the treaty recognises in Article 9 but leaves to parties to realise under national law. Governments should include at least three measures in their attempts to promote Farmers' Rights according to Article 9.2:

- protection of traditional knowledge relevant to plant genetic resources for food and agriculture;
- the right to equitably participate in sharing benefits arising from the utilisation of plant genetic resources for food and agriculture;
- the right to participate in making decisions, at the

[119]Veljkovic V and Ho M-W (2002) Edible AIDS vaccine or dangerous biological agent?
http://aidscience.org/Debates/aidscience019d.asp

national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

D. The International Union for the Protection of New Varieties of Plants (UPOV)

The International Union for the Protection of New Varieties of Plants (UPOV) adopted its first Convention in 1961 after four years of meetings between various European states. It has been revised three times since in 1972, 1978 and 1991. The main aims of the Convention are to promote the protection of the rights of breeders of new plant varieties for the development of agriculture. The modification of the Convention in 1991 sought to maintain the effectiveness of breeders' rights in the face of changing technologies. This led to the introduction of stronger terms which are now the only terms under which new members may join. A key addition was designed to prevent genetic engineers from adding single genes to existing varieties and exploiting the modified variety with no recognition of the contribution of the breeder of the existing variety. Such modified varieties are now seen as 'essentially derived' varieties and may not be exploited without the consent of the original breeder.

E. The World Intellectual Property Organisation (WIPO)

WIPO is the specialised UN agency 'to promote the protection of intellectual property throughout the world through cooperation among States and, where appropriate, in collaboration with any other international organization'[126]. Developments here could provide the basis for additional issues to be included in the TRIPS Agreement. An Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC) was set up in 2001 to consider the difficult issues arising in those areas. This will discuss IP in relation to access to genetic resources and benefit sharing, the protection of traditional knowledge and expressions of folklore. Following two meetings of the committee in 2001, the WIPO secretariat is preparing model IPR clauses for

Table A2. Comparison of UPOV provisions vs patents

Provision	UPOV 1978 Act	UPOV 1991 Act	Patent Law
Protection coverage	As many plant genera and species 'as possible'. Minimum of 5 on joining and of 24 after 8 years	Minimum of 5 on joining. 10 years later, must protect all plant genera and species	Inventions
Requirement	Novelty (variety must not have been commercialised) Distinctness Sufficient Uniformity having regard to the particular features of variety's propagation Stability	Novelty (variety must not have been commercialised) Distinctness Sufficient Uniformity having regard to the particular features of variety's propagation Stability	Novelty (invention must not have been published) Non-obviousness (inventiveness) Industrial applicability (usefulness)
Protection term	Minimum 15 years (18 years for trees and vines)	Minimum 20 years (25 years for trees and vines)	Minimum 20 years (TRIPS)
Protection scope	Production for commercial purposes and offering for sale and marketing of propagating material of the variety	Commercial transactions with propagating material. Harvested material protected only if produced from propagating material without breeder's permission and if breeder had no reasonable chance to exploit his right over it	Making, using, selling patented product; using patented process
Breeders' exemption	Yes	Yes. *Essentially derived* varieties can only be marketed with the agreement of the breeder	No
Farmers' privilege	Minimum scope of protection allows a farmer's privilege	Each member State can define a farmer's privilege suitable for its conditions	No
Prohibition of double protection	Any species eligible for PBR protection can not be patented	The Act is silent on this question; countries may choose to exclude plant varieties from patent protection	Many countries exclude plant varieties, as such, from patent protection

Source: See note 112

[126]Article 3, Convention Establishing WIPO. 14.07.67

contractual agreements on access and benefit sharing (ABS) – although these will need to take into account both the CBD code and the ITPGRFA. They are also working on documenting public domain TK to ensure patent examiners can use them to prevent misappropriation of this knowledge, as has happened on a number of well-publicised occasions and given rise to concern in developing countries about biopiracy – the unauthorised commercial exploitation of the knowledge and resources of traditional and indigenous communities in developing countries[127].

Although the IGC is most directly concerned with genetic resources and traditional farming communities, other deliberations in WIPO could affect the bigger picture in the use of IP and remove the apparent flexibilities negotiated into TRIPS, for example through moves to harmonise requirements in national patent regimes. Harmonisation would make the patent system of countries more like each other in terms of administrative procedures and rules, enforcement standards and substantive law.

A final area where WIPO may affect the nature of IP in low- and middle-income countries is through the technical assistance provided to countries to help them frame their laws and develop expertise in these areas. There have been concerns raised by those outside WIPO that this is too narrowly focussed and has not supported countries enough in using the flexibilities contained with TRIPS[128].

[127]See note 113

[128]MSF et al meeting, Geneva, 28.03.02

Annex 2: Agricultural research and development

Annual funding for agricultural research grew quite rapidly in industrialised countries after the second world war but these rates have fallen considerably since the early 1980s[129]. About half of agricultural R&D is now financed from the private sector in the OECD countries, whereas the figure for overall scientific R&D funding is about 75% private and 25% public. The public sector has tended to focus more on farm-level technologies to increase agricultural productivity than the private sector, which focuses more on food and kindred products and animal health and agrochemicals. In 1993, for example, about 12% of private R&D was focussed on farm level technologies, compared to 80% for publicly funded R&D. More recently, the focus of publicly funded research has shifted from enhancing agricultural production to including more post harvest and food safety concerns according to work by the International Food Policy Research Institute. It showed there has also been a move away from public funding for applied agricultural research in some developed countries, notably the USA, UK and the Netherlands, with that being left to the private sector, and a greater focus on basic research. In the USA, the focus of private agricultural R&D has changed from agricultural machinery and post-harvest food-processing research (about 80% of the total in 1960) towards plant breeding and veterinary and pharmaceutical research. Just three countries - the USA, Japan and Germany – account for 70% of the chemical research related to agriculture.

The poorer countries now account for about half of publicly funded agricultural R&D. Between 1971-91, research expanded most rapidly in East Asia and the Pacific Rim countries, including China, West Asia and North Africa but much more slowly in Sub-Saharan Africa and Latin America and the Caribbean regions. More recently similar factors to those in the OECD countries may have led to reductions in these growth rates.

A International agricultural research

For over 30 years there has been an international effort to generate freely shared agricultural research results that could be used by researchers in poorer countries to benefit their farmers, especially poor farmers. This was largely done through 16 International Agricultural Research Centres (IARCs) which operate under the Consultative Group on International Agricultural Research (CGIAR). They receive about $340 million per year from an *ad hoc* group of 58 donors. This is about 4 per cent of total public spending on agricultural research worldwide.

The issue of how to handle IP has divided the IARCs for years[130]. The International Maize and Wheat Research Institute (CIMMYT), for example, published its IP policy in spring 2000, which accepted patent usage as a last resort - and has received strong NGO criticism for doing so[131]. The Centre has found that dealing with IP has taken up more time over the past 10 years and is considering hiring an IP manager. These issues do not just divide members of the CGIAR system but all the stakeholders involved, as is illustrated in the latest, non-consensus, report of the multi-stakeholder dialogue Crucible II group[132].

Their concerns have been driven by developments in biotechnology, Plant Variety Protection PVP (such as plant breeders rights) and patenting, rather than other areas of IP such as copyright, although this does have implications for the costs of and access to databases and publications[133].

The IARCs' work has largely been built on cooperative, sharing of materials and results not legalistic and competitive activities, which the moves to more proprietary science appear to fuel. Some want them to patent as a defence against their work being taken over by others. Others question how far the Centres can patent defensively, in which countries or how far they can use patented technology as a bargaining chip with private companies – as they lack the assets to join the big league biotech spenders. Similar questions arise for research in many poor countries. The Centres' spending on biotech research is a tiny fraction of that spent by the private sector - around $25-30 million annually compared to industrial companies spending probably hundreds of times that ($10 bn in 1998 in US alone according to Ismail Serageldin, former chair of the CGIAR). The Centres' legal capacity to defend patents are minimal and patents are useless unless you can afford to defend them from infringement. Infringements so far have largely been identified by small NGOs who have used publicity to try to reverse some, and helped mobilise developing countries governments to defeat others. Litigation costs are high and will almost certainly detract from the basic work the Centres are supposed to do.

A1 Genebanks and IPRs

The CGIAR system also manages a global network of genebanks. The IARCs hold about 600,000 accessions in their various genebanks, mostly collected before the Convention on Biological Diversity came into force. It is about 40 per cent of the global total and is the largest collection of such material. It is formally held in trust by the CGIAR for the benefit of humankind through an agreement made with FAO in 1994. The collections may now be covered by the new International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) if the individual IARCs become Parties to the Treaty.

Currently, no IPRs can be taken out on the germplasm

[129]Pardey P G and Beintema N M (2001) Slow Magic: Agricultural R&D A Century After Mendel Washington DC: International Food Policy Research Institute. http://www.ifpri.org/pubs/pubs.htm#fpr

[130]Bragdon S H and Downes D R (1998) Recent policy trends and developments related to the conservation, use and development of genetic resources, IPGRI: Issues in Genetic Resources No 7

[131]RAFI Geno-Types (2000) The Spill out from CIMMYT's Revised Patent Policy. See note 113

[132]The Crucible II Group (2000) Seeding Solutions, Vol 1. Policy options for genetic resources: People, Plants and Patents revisited. IDRC, IPGRI and Dag Hammarskjold Foundation

[133]See note 5

in these genebanks, and bilateral material transfer agreements (MTAs) are used when the material is supplied imposing these conditions. However, there have been cases of this requirement being ignored. "The status of the CGIAR collections and their continued availability to assist the guarantee of food security in the South has been imperilled by the availability of intellectual property protection to permit privatisation of this germplasm", according to Michael Blakeney[134].

The introduction of PVP mainly benefits commercial breeders. In the USA, public sector breeding programmes have found it harder to get materials from companies which has interfered with their ability to release new lines and train students[135]. Tim Reeves, director of CIMMYT, also says that the expansion of PBRs is leading to some collaborators no longer sending their best lines for use in the breeding programmes, but the second best.[136] Since the breeding programmes work by many partners exchanging material, everyone normally gets much more out of them than they put in, but if the quality of what is put in goes down, everyone will suffer. This would affect low- and middle-income countries most since a study of germplasm flows over a 20 year period found that these countries are net recipients of germplasm from CGIAR genebanks and averaged a ratio of 60:1 in terms of samples received to samples donated to CGIAR gene banks. For improved materials generated by the research programmes in the centres, the ratio went up to 200:1. Much of the CGIAR-held materials is distributed within the region where it was collected and more went to low- and middle-income countries than industrialised countries, with minor amounts going to the private sector[137].

A2 Freedom to operate

Many IARCs and national researchers in low- and middle-income countries operate in territories where the products and US or European patented research processes and products they might want to use are not subject to patents. This may be because patents have not been applied for there or because the subject matter is not patentable in that jurisdiction. In this case there is no legal barrier to using them, although they may not be obtainable from the patent holder. Even where they are patented, they may wish to use them on crops or for purposes that commercial companies have no interest in. It is important for these researchers to have the ability to use the full range of research tools and products they need in their work.

Too often patenting practice in the USA is seen as the system to emulate, or the one that has to be adopted by other countries. However US patent practice has seen the loosening of definitions on inventive step, discovery and industrial application, plus an apparent willingness to leave it to the courts to decide the validity of patents. US practice is fuelling concern and resentment globally about the acquisitive tactics of US firms and prompting industry to drive European, Japanese and other industrialised country governments to follow suit. Biotechnology is seen largely as an industrial competition issue, with the USA, EU and Japan each determined to be a major player in the industry. But in the 'winner takes all' game of patents, where the USA already has a major lead, the EU and Japan could well lose, leading them to depend on licenses from the USA and a steady stream of royalty flows to there.[138]

[134]Blakeney M (2001/2) Intellectual Property Rights and Food Security in Bio-Science Law Review 4 5, p 5

[135]Riley K (2000) Effects of IPR Legislation on the Exchange and Use of Plant Genetic Resources. Dresden: GFAR, Dresden. http://www.egfar.org

[136]Personal communication, May 2000

[137]Cary Fowler C. (2000) Implementing Access and Benefit-Sharing Procedures under the Convention on Biological Diversity: The Dilemma of Crop Genetic Resources and the Origins. Dresden: GFAR, http://www.egfar.org

[138]See note 95