



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Enforcing TRIPS in Asia: The Implications for Agricultural Trade and Development, and an Agenda for Effective Compliance

Ronilo A. Beronio

Philippine Rice Research Institute

Jane G. Payumo

Philippine Rice Research Institute

E-mail: jgpayumo@philrice.gov.ph

ABSTRACT

In accordance with its mandate to ensure the production and trade of better and competitively priced goods and services around the world, the World Trade Organization has to enforce several multilateral agreements, one of which is that on the Trade-Related Aspects of Intellectual Property Rights (TRIPS). Geared towards protecting the intellectual property rights (IPR) of inventors and authors on goods traded worldwide, TRIPS sets minimum standards of IPR protection, which member countries can legislate. Due to the difficulty in estimating the impact of TRIPS on agriculture, it has spawned spirited debates among its proponents and critics since its implementation in 1995. Unfortunately, the bases of arguments from both sides about the impact of TRIPS on global goods trade in general, and on agricultural trade in particular, have been anecdotal. Although some economists have tried to develop models to analyze the impact of TRIPS on trade, their findings have been inconclusive. The same holds true as well with respect to the expected impact of TRIPS on agricultural trade and development.

This paper examines the legal provisions of TRIPS and their implications on Asian agricultural trade and development. It also discusses other issues—not addressed by TRIPS but attributed to it, such as agriculture R&D, “bio-piracy”, traditional knowledge and folklore, and plant breeder’s rights—whose links to TRIPS have not been established by evidence, or are, at best, anecdotal.

Documenting a specific application of TRIPS, the paper highlights the experience of the Philippines in the testing and commercialization of Bt corn, an agricultural biotechnology product developed and commercialized after TRIPS had gone into effect. The Philippine Bt corn experience provides some evidence that TRIPS and agricultural biotechnology—given the conducive environment of TRIPS-compliant domestic IPR laws, bio-safety policy regulations, information and education campaigns, and research and development—can have a positive impact on agricultural trade and development, even in a developing and agricultural country like the Philippines.

Based on the analysis of the current impact of TRIPS on Asian agricultural trade and development, and the Bt corn experience of the Philippines, the paper proposes an Asian agenda for member countries, by which they can effectively deal with, and benefit from TRIPS.

INTRODUCTION

The culmination in 1994 of the Uruguay Round of negotiations on the General Agreement on Tariffs and Trade (GATT) brought about the

agreement establishing the independent World Trade Organization (WTO). Essentially, the objective of WTO is to make the world a better place to live in through the production and trade of better and competitively priced goods and services,

within the framework of sustainable development – attaining these goals without depleting the world's natural resources, for the sake of future generations.

One of the several multilateral but legally binding agreements to be administered by WTO is that on the Trade-Related Aspects of Intellectual Property Rights (TRIPS). TRIPS sets minimum standards of intellectual property rights (IPR) protection, which member countries can legislate. TRIPS is meant to protect the IPR of inventors and authors on goods traded worldwide. The enforcement mechanisms of TRIPS also aim at reducing, if not totally eliminating, the global trade of counterfeit and pirated goods. Thus, if a good is not traded in the context of WTO, there is no violation of TRIPS.

It is much easier to appreciate IPR in the trade of manufactured goods than in agriculture trade. This difficulty, and the inability to estimate the impact of TRIPS on agriculture, might have spawned spirited debates among its proponents and critics since its implementation in 1995. Unfortunately, the bases of arguments from both sides about the impact of TRIPS on global goods trade in general, and on agricultural trade in particular, have been anecdotal. Although some economists have tried to develop models to analyze the impact of TRIPS on trade, their findings have been inconclusive. And nowhere is this observation truer than in the expected impact of TRIPS on agricultural trade and development.

There have been expressions of concern worldwide, some bordering on panic or hysterics, as usually articulated by nongovernment organizations (NGOs) in signatory countries, on the full implementation of TRIPS this year. They fear that poor and developing countries will lose their biodiversity, traditional knowledge and folklore, and traditional varieties to developed countries' commercial interests, because TRIPS authorizes other countries not only to exploit but even protect these valuable assets in their own countries as IPRs. This situation will effectively restrict the export to developed countries of goods with IPR components. Since most of the poor and developing countries' economies are mostly agriculture-based, there is fear that with the enforcement of TRIPS, their agricultural trade and development will be the first casualties.

This paper examines the provisions of TRIPS and their implications on Asian agriculture trade and development. It also looks at other issues not directly attributed to TRIPS, but which might have been spawned by its legally binding stipulations. In support of TRIPS, the paper provides evidence that its implementation may, after all, be beneficial to developing and least developed countries in Asia who are covered by its provisions. Finally, the paper outlines proposals on how these countries could comply with, and eventually benefit from TRIPS.

A SHORT REVIEW OF THE PHILOSOPHY AND NATURE OF IPRS

Intellectual property rights (IPRs) are legal rights granted by governmental authorities to control certain products of human intellectual effort and ingenuity (OECD 1996, quoted in Helfer 2004). Helfer says that two broad philosophical approaches underlie the decision to grant IPRs, and elements of these approaches can be found in different degrees in all national laws and international agreements relating to IPR. The first approach, which is dominant in civil law systems, holds the position that IPRs are human rights (see Article 27 of the United Nations' *Universal Declaration of Human Rights*). This normative approach believes that IPRs are stamped with the personality of their creator, inventor, or author. Only human beings can create IPRs because of their superior nervous systems but not all of them are endowed with the capability.

The second approach takes the view that IPRs are granted because the products they create enrich society's culture and knowledge, and thus increase its welfare. This instrumentalist philosophy of IPR shapes the structure of many national intellectual property systems. The grant of IPRs under this approach is intended to provide adequate incentives for creators, inventors, and authors to invest time, resources and the intellectual capital needed to create intellectual property products. Without exclusive rights over these products, its owners would lose out to the so-called "free riders" who could exploit the inexpensive distribution and reproduction technologies and sell others' intellectual property products at a much lower cost. One main objective of TRIPS — "to promote technological innovation, and the transfer and

dissemination of technology under a relationship of mutual advantage to producers and users of such technology, conducive to social and economic welfare and a balanced rights and obligations” — reflects this view.

IPRs are territorial in nature, and the protection awarded by a national government applies only within that country. To obtain patent protection in several countries, innovators must apply for, and gain rights in each. In countries where a technology is not subject to IPR protection, anyone is free to make, use, sell, import, etc., that technology. In contrast, however, an IPR application in one country serves as prior art to any other application anywhere in the world. But since IPRs are mere grants of the sovereign, they are not absolute rights. Holders cannot fully restrict the use of their IPR by third parties, so long as the use is authorized as an exception to IPRs, such as fair use, use for further research and development, personal use, and use which does not result to the user being unjustly enriched at the expense of the owner or holder of IPR, or the holder’s interest being prejudiced by the use. This is consistent with the universal legal concept of *solutio indebiti* (payment to one of what is not due to him). Thus, so long as no one enriches himself in the trade of others’ IPRs, or prejudices the interest of the IPR holder, he is not violating the IPRs of others.

Furthermore, IPRs are not inherent such as the right to life. As mere rights, the acquisition of which is defined clearly in law or procedure, they are not automatically vested, except for copyrights which are accorded at the moment of creation. Thus, in order for the IPR to be vested in its creator or author, one has to go through the process of its acquisition and maintenance; otherwise one is deemed to have either waived or slept on one’s right. On the other hand, the IPR, once vested on the author or creator, has to be enforced by the holder; otherwise, others will exploit the author’s right. IPRs were traditionally provided to chemical, electrical, and mechanical inventions, but TRIPS and the rapid developments in biotechnology have brought agriculture under equally strong IPR protection.

THE WORLD TRADE ORGANIZATION AND THE TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS (TRIPS)

The WTO was established upon the conclusion of the Uruguay Round of negotiations under the General Agreement on Tariffs and Trade (GATT), on April 15, 1994, in Marrakesh, Morocco. The WTO Treaty and its multilateral and plurilateral agreements came into force on January 1, 1995. WTO has the following objectives, namely: 1) to conduct trade and economic endeavors to raise standards of living, 2) to ensure full employment and a large and steadily growing volume of real income and effective demand, 3) to expand the production of, and trade in goods and services, and 4) to attain these objectives under the principle of sustainable development.

To effectively administer global trade, the WTO enforces legally binding multilateral agreements on trade in goods, services, and trade-related aspects of intellectual property rights (TRIPS). These agreements are backed by dispute settlement mechanisms and appropriate trade sanctions to ensure compliance among its members. Annexed to the Agreement establishing the WTO are multilateral agreements which bind the members and those that later accede to it. These agreements provide the ground rules for global trade, guarantee member-countries’ important trade rights, and bind them to certain obligations.

As of January 11, 2007, there were 150 WTO member-countries, and 31 observer governments. A hundred of the members are developing or least developed countries. Observer governments are to start accession negotiations within five years. The treaty’s substantive obligations became binding for developed nations in 1996, and for developing nations and nations in transition to market economies, in 2000; least developed nations were given until 2006 to comply.

Decisions in WTO are made by the entire membership and typically by consensus. A majority vote is also possible but it has never been used, and was extremely rare under the GATT, which was WTO's predecessor. The WTO's top-level decision-making body is the Ministerial Conference which meets at least once every two years. Below this is the General Council (normally made up of ambassadors and heads of delegation, or other officials occasionally sent by the member-countries) which meets several times a year in the Geneva headquarters. The Council also meets as the Trade Policy Review Body and the Dispute Settlement Body.

Going down the hierarchy, the Goods Council, Services Council, and Intellectual Property Council report to the General Council. Numerous specialized committees, and working groups and parties deal with the individual agreements and other areas such as the environment, development, membership applications, and regional trade. WTO has a secretariat based in Geneva which supplies technical support for the various councils and committees and the ministerial conferences; provides technical assistance for developing countries, to analyze world trade, and to explain WTO affairs to the public and media; extends legal assistance in the dispute settlement process; and advises governments wishing to become members of the WTO.

TRIPS is contained in Annex 1C of the Agreement establishing the WTO. It is the first and only IPR treaty that seeks to establish universal, minimum standards of protection across major fields of intellectual property, including copyright and related rights, trademarks, geographical indications, industrial designs, patents, integrated circuits, and trade secrets. Because of its comprehensiveness, pervasiveness, legally binding effects, and enforceability, TRIPS can be considered, in international law parlance, a "hard law". While it sets minimum standards, it specifies in a very detailed manner the exact provisions for national laws on IPR acquisition, maintenance, and enforcement. It also brings national IPR legislation under the coverage of WTO dispute settlement procedures. (Appendix Table 1 presents the important features of TRIPS.)

TRIPS also incorporates all major international conventions and treaties on IPR, such as the

Berne Convention for the Protection of Literary and Artistic Works (1971); the Paris Convention (1967) for the Protection of Industrial Property; the Rome Convention (1961) for the Protection of Performers, Producers of Phonograms, and Broadcasting Organizations; and the International Convention for the Protection of Integrated Circuits. Thus, TRIPS also established a formal relationship with the World Intellectual Property Organization (WIPO), the body that administers most of the existing treaties on IPRs. Despite its having no clear provisions for the protection of animal and plant varieties, including microorganisms, TRIPS, in clever legal language, obliges members to provide some kind of effective protection through a *sui generis* (one-of-a kind system), a patent, or both. This provision of TRIPS made it very important to agriculture.

STATUS OF ASIAN AGRICULTURAL TRADE AND DEVELOPMENT

The Food and Agriculture Organization (FAO) defines agricultural trade as the import and export of agricultural products as an important source of foreign exchange and a crucial component of food security. The Asian Development Bank (ADB) defines agricultural development as the improvement of agricultural productivity to stimulate the agricultural economy, eliminate poverty, and improve the quality of life and well-being of people in the rural areas.

Asia, the Earth's largest continent, has a land area of 3.18 billion hectares and is home to 3.8 billion people or about 60% of the world's population (FAOSTAT 2005). It is the most rapidly growing region of the world economy today, and according to the 2004 report of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the region contributed 35.6% of the world's gross domestic product in 2002. Its GDP grew at nearly 5 percent in 2004 (Appendix Table 2), higher than that of other regions like North America (4.1%), Europe (2.3%), and Africa (4.4%) (Appendix Table 3). The region's merchandise export and import volumes are estimated to have risen by 14 percent (about three times faster than its GDP growth), largely due to the strong growths of Japan, China, and India (WTO 2005).

Agriculture contributed about 18% to Asia's GDP in 2004 (Appendix Table 4). More than 50% (1.68 billion hectares) of Asia's land is devoted to agriculture. In 2004, Asia's agricultural exports, which rose by 18% to \$143 billion, accounted for 6% of the region's merchandise exports and 8.4% of total merchandise imports (Appendix Table 5). In addition, the region's share of primary agricultural products in trade is 30% for imports and 43% for exports (Appendix Table 6), compared with South and Central America's 29%, although smaller than Europe's.

Asia is the second leader in scientific investment, with public and private funding accounting for 32% of the world's gross expenditure on research and development (GERD) in 2002, overtaking Europe which contributed 27% of GERD. One of its areas of investment is biotechnology, joining the ranks of the US, Europe, Canada, South America, South Africa, and Australia. It supports the safe and appropriate use of biotechnology to produce agricultural products that are healthy and safe for humans and animals, protect the environment, preserve medium or small-sized farms, and safeguard the interests of farmers and consumers. Asian agricultural biotechnology R&D focuses on: (i) increasing crop and animal productivity; (ii) improving nutritional quality; (iii) broadening the tolerance of crops to drought, salinity, and other abiotic stresses; and (iv) increasing the resistance of crops to pests and diseases (ADB 2001). The dominant Asian countries doing agri-biotech R&D are Japan, China, India, and Singapore. Thailand, Korea, and the Philippines have likewise started building their capabilities in agricultural biotechnology R&D. For agricultural biotechnology commercialization, China, India, the Philippines, and Iran are among the 21 countries worldwide growing genetically modified (GM) crops covering about 11.60 million acres (ISAAA 2005). (Appendix Table 7 presents the status of research and application of crop biotechnologies, while Appendix Table 8 presents the GM crops planted in developing Asia).

STATUS OF INTELLECTUAL PROPERTY RIGHTS IN ASIA

The strength of IPR laws and their enforcement among Asian countries vary, depending on the

sophistication of the economy, links with western countries with strong IPR regimes, and their stage of industrial development. Most Asian countries have enacted their first IPR laws within the last ten years, essentially after TRIPS; and many, while having IPR laws, have weak enforcement mechanisms. In contrast, most western countries have IPR laws dating back to the nineteenth century. Singapore, a unique case in Asia, but with strong links with the British judicial system, has the strongest IPR regime. China, which has only recently embarked on a market economy, has the weakest (Deng et al. 1996).

The challenge that still remains for Asia is to be removed from the United States Trade Representatives' (USTR) Special 301 list, which categorizes many countries as IPR infringers and promoters of unfair trade practices. The USTR considers IPR violations as widespread in Korea (patents); Thailand and the Philippines (trademarks); and China, Thailand, Indonesia, and Korea (copyrights). China's weak IPR protection and enforcement continue to be the priority for monitoring by USTR. India, Indonesia, Kuwait, Pakistan, the Philippines, and Turkey are still in the priority watch list, while ten others are in the watch list. The USTR's priority watch-listed countries are those that do not provide an adequate level of IPR protection or enforcement, or market access for persons relying on intellectual property protection, whereas those in the watch list are those that will receive US bilateral attention to address IPR problems.

Developing countries in Asia, however, are initiating actions, and making good progress, in establishing adequate IPR acquisition, maintenance, and enforcement mechanisms, toward the full implementation of their TRIPS obligations. Increasingly, China, Korea, and India have also become more attractive locations for investments with IPR components. Evidence of this is the increasing trend in patent applications in these countries, both domestic and foreign, with increasing rates of 19.4% (2003-2004), 17.3% (2003-2004), and 20.71% (2001-2002), respectively. In fact, the combined record of patent applications in eight developing countries in Asia exceeds that of the US, Japan, and Europe. (Appendix Table 9 presents the record of patent applications in these countries from 1999 to 2004.)

GENERAL OBLIGATIONS AUTOMATICALLY REQUIRED OF ASIAN MEMBER-COUNTRIES UNDER WTO-TRIPS

1. The obligation to automatically incorporate or legislate domestically the TRIPS provisions in their legal system (Paragraph 2, Final Act)

Almost all countries in Asia have joined WTO either as original members or have recently completed accession. A total of 27 developing countries in Asia have acceded and ratified GATT-WTO since 1995. Ten more countries are on observer status and expected to accede soon (Appendix Table 10). Original members are expected to submit, when necessary, for the consideration and approval of their respective authorities, the WTO Agreement (Article 2(a) of the Final Act). Non-original members are required to conclude negotiations for their accession before they become contracting parties to the Agreement. The schedules of accession are not definitive (Article 5 of the Final Act). Once countries become members of the WTO, the WTO Agreement and the multilateral agreements, together with their associated legal instruments included in Annexes 1, 2 and 3 become automatically legally binding on them (Article II.3. WTO Agreement). This includes TRIPS which is Annex 1C of the WTO agreement. The WTO agreement does not allow waivers of the other agreements, except the plurilateral agreements, which are voluntary.

2. The obligation to incorporate or legislate the minimum standards of IPR protection set by TRIPS (Article 1, TRIPS)

IPR protection under TRIPS includes matters affecting the availability, acquisition, scope, maintenance, and enforcement and use of IPRs. Standards that TRIPS sets for IPR protection may seem minimal but TRIPS is more encompassing than other existing IPR treaties. For instance, TRIPS enumerates the following major fields of intellectual property, namely: copyright and related rights, trademarks, geographical indications, industrial designs, patents, integrated circuits, and trade secrets. Although plant variety protection or plant breeders' rights are not explicitly mentioned,

Article 27 of TRIPS provides or allows recognition of this IPR, as will be discussed later.

Where other IPR treaties may have failed, TRIPS also specifies, in an organized and detailed manner, the exact provisions for suggested domestic laws on IPR protection. It also brings national IPR legislation under the coverage of WTO dispute settlement procedures. Thus, Asian countries who are members of TRIPS are required to legislate or to promulgate IPR laws, rules and regulations for the implementation of the minimum requirements of TRIPS in their respective jurisdictions, including the enforcement of IPRs through civil and administrative procedures and remedies, provisional remedies, border measures, and even criminal procedures. In addition, TRIPS requires member-countries to provide for the acquisition and maintenance of IPRs and related inter partes (two opposing parties) procedures.

3. The obligation to accord TRIPS a higher priority over their responsibilities under other IPR treaties where they are also members (Paragraph 2, Article 2, TRIPS)

Comprehensively, TRIPS incorporates the substantive provisions of the Paris Convention for the Protection of Industrial Property (1971); the Berne Convention for the Protection of Literary and Artistic Works (1971); the Rome Convention (1961) for the Protection of Performers, Producers of Phonograms, and Broadcasting Organizations; and the International Convention for the Protection of Integrated Circuits. But obligations under TRIPS take primacy over the member countries' responsibilities under these IPR treaties where they are also members. For non-members of these other IPR treaties, the provisions of these treaties incorporated in TRIPS serve as reference in their promulgation of IPR domestic legislation.

As far as agriculture is concerned, however, Article 1(3) of the 1978 revision of the Paris Convention for the Protection of Industrial Property provides that "industrial property shall be understood in the broadest sense and shall apply not only to industry and commerce proper, but likewise to agricultural and extractive industries and to all manufactured or natural products, for example, wines, grain, tobacco leaf, fruit, cattle, minerals,



mineral waters, beer, flowers, and flour.” Thus, despite its having no explicit provisions covering agriculture, the drafters of TRIPS, by incorporating the Paris Convention, have effectively incorporated agriculture in the coverage of the agreement. Furthermore, as will be discussed more extensively later, despite TRIPS’ having no clear provisions for the protection of animal and plant varieties, including the protection of microorganisms, it obliges its members to provide some kind of effective protection for plant varieties. Thus, without being explicit about it, TRIPS has placed Asian agriculture under its coverage.

4. The obligation to provide the same treatment for IPR protection to nationals of other members, as they provide to their own nationals (Article 3, TRIPS)

Requiring its equal application to the nationals of all member-countries, protection refers to matters affecting the availability, acquisition, scope, maintenance, and enforcement and use of IPR. Nationals refer to persons, natural or legal, who are domiciled or who have a real and effective industrial or commercial establishment in the member’s territory. Under this provision, TRIPS bars members from discriminating against foreign IPR owners, in favor of their domestic creators and inventors. This obligation levels the playing field among nationals of treaty parties who do business in each other’s territory.

5. The obligation to extend a most-favored-nation (MFN) status to other members (Article 4, TRIPS)

The MFN clause provides that any advantage, favor, privilege, or immunity granted by a member to the nationals of any other country, shall also be accorded immediately and unconditionally to the nationals of all other members. The MFN, in effect, prevents a subset of states within TRIPS from entering into bilateral or other special agreements among themselves and providing better concessions. If they do so, they are then required to accord the same benefits to their fellow members, who are not within the subset.

6. The obligation to cooperate with other members in eliminating trade in counterfeit trademark goods and pirated copyright goods (Article 69, TRIPS)

This provision requires members to cooperate with each other in eliminating international trade in goods infringing intellectual property rights. Specifically, members are expected to promote the exchange of information and cooperation between their respective customs authorities to eliminate trade in counterfeit trademark goods and pirated copyright goods.

**SPECIFIC TRIPS PROVISIONS
WITH IMPLICATIONS ON ASIAN
AGRICULTURAL TRADE AND
DEVELOPMENT**

1. The provision incorporating the Paris Convention, which considers agriculture and extractive industries as industrial property (Article 2, TRIPS; Footnote to Article 1, Paris Convention)

The inclusion of agriculture in TRIPS is not immediately apparent, except in Article 27 which mentions protection on plant varieties through a sui generis (one of a kind) system, or patent, or both. Implicitly, it is established by the inclusion in TRIPS of Articles 1 to 12 and 19 of the Paris Convention on Industrial Property. Based on WIPO’s definition, industrial property is not limited to industry and commerce, but includes agricultural and extractive industries, and all manufactured or natural products. Although TRIPS excludes plants and animals from patentability, members are required to provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof (Article 27.3(b)). Given the significant contribution of agriculture in Asian economies, and its very rich biodiversity, the impact of this provision on Asian agriculture cannot be overlooked. Furthermore, the rapid developments in biotechnology, and its tremendous application to agriculture in Asia, may justify the inclusion of IPRs in agricultural trade.



Bonilla and Robinson (2003) and Peoples (2004) forecast a significantly growing agricultural trade, which stands at less than 10% of world merchandise exports, largely from agricultural biotechnology products. IFPRI also claims that once the world agricultural trading system is freed from domestic protection and extensive production and export subsidies, the prospects of agricultural trade by Asian countries will be very bright.

2. The provision on geographic indications (Section 3, TRIPS)

A relatively new IPR, geographic indications are defined by TRIPS as “indications which identify as originating in the territory of a member, or a region, or locality in that territory, where a given quality, reputation or other characteristics of the good is essentially attributable to its geographical origin” (Article 22). Classic examples of geographic indications are: “Champagne”, “Cognac”, “Roquefort”, “Pilsen”, “Havana”, “Tequila”, etc. These are originally names of places where the product came from, but instead of associating the names with places, they have become associated with a certain nature or quality of a product. Since these names have acquired a high reputation, they have become valuable commercial assets. For this reason, they are often exposed to misappropriation, counterfeiting, or forgery, and their protection has become desirable.

The concept of geographical indication in TRIPS is different from the Paris Convention on Industrial Property’s “indications of source and appellations of origin”. The concept of appellations of origin consists of certain characteristics of the product which are exclusively or essentially attributable to its geographical origin, such as for example, climate, soil or traditional methods of production. On the other hand, the use of indications of source on a given product is merely subject to the condition that this product originates from the place designated by the indication of source. In Asia, a good example of appellations of origin is the “Basmati” rice coming from specific regions of India and Pakistan. Another example would be the “Jasmine” rice of Thailand.

3. The provision on technology transfer (Article 7 and Paragraph 2, Article 8, TRIPS)

Not limited to the protection and enforcement of IPRs, TRIPS also aims to contribute to the promotion of technological innovation and transfer and dissemination of technology. This goal is to be pursued with consideration of 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 (Article 7). TRIPS also requires appropriate measures so as not to adversely affect the international transfer of technology (Paragraph 2, Article 8). TRIPS can induce technology transfer by disclosing information on patent applications for further research, and for free use after the expiration of the patent. In addition, the ability to retain control over their technologies allows companies to transfer complementary skills to other countries — either through licensing agreements or foreign direct investments. Thus, IPR can assist in the diffusion process of new knowledge within and between economies.

4. The provision on patenting or providing a sui generis system for plant varieties, and by implication, agricultural biotechnology (Article 27, TRIPS)

Although TRIPS did not specifically state that biotechnology or agricultural biotechnology per se is patentable, the phraseology of Article 27, particularly its definition of patents, and the international evolution of these two terms and the actual data on patents issued in different countries implicitly confirms the patentability of biotechnology and agricultural biotechnology.

The Convention on Biological Diversity (CBD) defines biotechnology as “any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use”. It adds that biotechnology is “technology”. TRIPS provides that “patents shall be available for any inventions, whether products or processes, in all fields of technology, provided they are new, involve an inventive step, and are capable of industrial application”; and “patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology, and whether products are imported or locally produced.”

The parallelism between CBD's (1992) definition of biotechnology and the TRIPS' (1995) description and applicability of patents is obvious. This synonymity is very significant, such that some authors (including us), believe that IPR, particularly patents and biotechnology, are not only intertwined, but also almost synonymous with each other. In fact, one can say that biotechnology is intellectual property.

The United Nations Conference on Trade and Development and the International Center for Trade and Sustainable Development (UNCTAD and ICTSD 2001) believe that the interpretation that Article 27 of TRIPS covers life forms, began with the 1980 US Supreme Court decision in the case *Diamond v. Chakrabarty*, where the court held that anything made by the hand of man, including his modification of life forms, is eligible for patenting. It could also be argued that the drafters of Article 27 of TRIPS may have had the *Chakrabarty* decision in mind.

Based on the preceding discussion, agricultural biotechnology may be defined simply as biotechnology applied on agriculture. Patents for agricultural biotechnology are very important because the products and processes involved are easier to copy compared with other technology-intensive products. Seeds can be replanted, genes can be cloned based on sequence information, and methods can be copied following established protocols (Mayer 2003). Because of the biodiversity of Asia, the impact of TRIPS on its agriculture will be more dramatic, especially with respect to the patenting of agricultural biotechnology-generated products and processes.

5. TRIPS and other International IPR-related Agreements in agriculture (Article 5, WTO Agreement)

Although TRIPS is independent from other IPR international agreements, except those that are embedded in it, it also faces some problems in relation to these treaties. Prominent among them are the 1992 Convention on Biological Diversity (CBD); the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA); and the 1991 International Union for the Protection of New Plant Varieties. Helfer (2004) claims that TRIPS has created tensions between

IP protection standards and the principles, norms, and rules of these other international regimes. For instance, CBD recognizes the sovereignty of countries over their genetic resources, while promoting the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including access to them and transfer of relevant technologies. It recognizes the IPRs on these genetic resources. There are 190 country governments that are party to CBD; 168 of them have ratified it (CBD 2006).

The ITPGRFA, otherwise known as the seed treaty, also aims at the conservation and sustainable use of plant genetic resources for food and agriculture, and the fair and equitable sharing of the benefits arising out of their use, in harmony with the CBD. It recognizes as rights the role of indigenous communities and farmers of all regions of the world in the conservation and development of plant genetic resources. The treaty makes no mention of IPR, although it recognizes the farmers' right to save, use, exchange and sell farm-saved seeds/propagating materials. There are 111 parties to the treaty (CGRFA 2006).

The UPOV recognizes and grants plant breeders' rights over the varieties they breed, or discover and develop, in all plant genera and species. Although the treaty does not treat plant breeders' rights as IPRs, these can be considered a property right.

Offhand, there seems to be conflict among the provisions of these treaties, as in essence they deal in one way or the other with agriculture. Except for the UPOV, which explicitly recognizes the right of the plant breeder to prohibit the importation of the products of the variety he developed without his consent, the other treaties merely provide guidance on how genetic resources are to be accessed.

Stripped of the hysteries and nonessentials, there is or there should actually be no conflict whatsoever between TRIPS and these treaties. TRIPS becomes relevant only when goods with IPR components are traded; or, to extend the argument a little further, when goods with IPR are being used for the commercial benefit of third parties without permission or benefit to the IPR owners. The other treaties, on the other hand, deal with access to genetic resources, preservation of biodiversity, and use of seeds, generally for non-commercial

purposes. Thus, when these resources are traded for the commercial gain of its trader, without the permission of the owners, then TRIPS is the primary international law that should be applied, and the other treaties applied in a somewhat supplementary manner. In effect, so long as these genetic resources are not traded, and there is no commercial gain prejudicing the interest of the IPR owners, there is no conflict with TRIPS.

This issue is very relevant among Asian countries who are members of the WTO because most of them are also signatories to these other treaties (Appendix Table 10).

OTHER ISSUES ARISING FROM TRIPS AND THEIR RELEVANCE TO ASIA'S AGRICULTURAL TRADE AND DEVELOPMENT

This chapter discusses other issues not directly addressed by TRIPS but which are relevant for its effective implementation. These issues may also have arisen because during the implementation of TRIPS, many other treaties were entered into by countries who are also members of WTO. In signing these treaties, these countries may not have totally grasped the implications of the interaction of these treaties with each other, and the effects of the interactions on their respective countries. The effects of these unknown interactions may have resulted into what we will call "hysteria" from sectors or their representatives, who perceived themselves to be adversely affected by TRIPS and the other treaties. Many of the hysterics come from non-government organizations, environmentalists, academe, research, and even government institutions. But as already mentioned, there seems to be no substantial evidence to establish the negative impact of TRIPS on Asian agricultural trade and development, particularly on the regions' affected sectors such as the farmers and indigenous peoples.

1. TRIPS as Impediment to Asian Agricultural Research and Development (R&D)

Assured of IPR protection under TRIPS, private companies have taken the lead in the patenting of agricultural biotechnologies, particularly the techniques used in genetic engineering, and

genetically engineered plants. Examples of these firms are Monsanto, Dupont, Syngenta, Bayer, and Dow. Although public and other private agriculture R&D institutions in Asia may be confronted with a complex web of ownership and freedom-to-operate issues in the conduct of further agricultural research and development, at least Asian researchers will become aware in advance of the IPR issues of technologies they are using. At the earliest opportunity, too, transparent and mutually favorable technology transfer arrangements can be made. This will preclude a future situation where an Asian researcher scores a breakthrough only to find out that he or she has no freedom to operate because of the failure to address IPR ownership issues.

Vitamin-A rice, for instance, was reported to have 70 patents originally held by 31 different organizations (Kryder et al. 2000), although the freedom-to-operate (FTO) requirements have been reduced to less than 10. In addition, because of the commodity's importance, the technology's owners have allowed limited commercialization for poor rice farmers.

The concern about current developing-country access to essential IPR may be exaggerated, and possibly, the relationship between IPRs and agricultural research and national agricultural research centers in developing countries is poorly misunderstood (Pardey et al. 2003). In contrast to what is commonly perceived, international agricultural centers have far greater FTO – the ability to practice or use an innovation – in agricultural research on food crops for the developing world. The spatial aspects of IPR are pivotal to FTO in agricultural research. Pardey et al. (2003) likewise claim that agricultural researchers are freer than one might think to make use of innovations protected in the developed countries because there is no such thing as "international patent right". Patents or other rights awarded in the US do not a priori confer property rights in the rest of the world.

Typically, enterprises engaged in research only make investments if legal protection is available for the results of their research. As with other inventions, there is an obvious need to protect agricultural inventions, not only in behalf of the interest of inventors and their employers, but also that of the public, in order to promote technological progress. A strong IPR system is thus crucial to the development of the agricultural biotechnology



sector. Asia, therefore, has to put in place strong IPR regimes to attract high-quality agricultural research and development that yields excellent results and products.

2. TRIPS as License for the Piracy of Asian Biodiversity (“Bio-piracy”)

One worldwide phenomenon that critics associate with TRIPS is “bio-piracy”. Bio-piracy refers to the appropriation of biological resources without the prior informed consent of the local communities and the competent authority of the state, where these resources are found, for access and benefit sharing, under mutually agreed terms (ITDRC and IPGRI 2000). According to Panutamon and Lianchamroon (1998), bio-piracy—or, in layman’s terms, the stealing of genetic material and knowledge from communities in the gene- or biodiversity-rich developing countries—is an exploding issue in Asia. The biotechnology-rich but biodiversity-poor developed countries of the North have been accused of exploiting and securing ownership rights over the natural resources of the biotechnology-poor but biodiversity-rich South. Usually cited as examples are the attempts to patent variants of the Jasmine rice variety of Thailand and the Basmati rice varieties of India and Pakistan in the US and Europe. In both cases, applications for patents and copyrights on the variants of these two rice varieties have been filed in United States by a firm named RiceTec of Texas. If it had succeeded, the registered new strains could compete with the traditional and aromatic Basmati and Jasmine rice exports from India, Pakistan, and Thailand (FAO 2002). India’s share in the world market for basmati rice is about 53% (MCI 2006), and that of Thailand’s jasmine rice, 25.17% (Sriboonchitta 2004). Among the string of highly controversial cases which stand to benefit the patent-holding corporations under the TRIPS agreement are those involving the turmeric of India, ayahuasca vine of the Amazon, and quinoa of Bolivia. These plants have been used by communities, where they originated, centuries before transnational corporations discovered or misappropriated them. (See Appendix Table 11).

In the case of India and Pakistan’s basmati rice and Thailand’s jasmine rice, the attempts at misappropriating these geographical indications or

trademark in the US failed. And it may have failed then, not directly because of TRIPS but because of the universal concept of prior art in patent applications, and the vigorous efforts of the Indian and Thai governments to oppose the applications in the US, on that ground. But the TRIPS provisions on geographic indications now provide a stronger and more universal protection of these biodiversity-based IPRs. The success of other countries with advanced IPRs in pirating from the wealth of Asian biodiversity is unfortunate, but TRIPS should also prevent the same from happening again.

3. TRIPS as License to Pirate Traditional Knowledge and Folklore for Patent Purposes

Traditional knowledge (TK) is defined by GRAIN (2002) as the “indigenous people’s awareness and understanding of traditional and indigenous useful information, which is passed on from one generation to the next, usually by word of mouth or example within a specified group of people.” The TRIPS provisions, particularly those on patenting, are perceived to provide control and ownership over TK by commercial interests at the expense of indigenous communities which developed and nurtured the valuable knowledge over generations. According to GRAIN (2002), some national laws, particularly in the US, do not recognize oral expressions as “prior art” evidence. In the US, oral expressions should be in writing to qualify as prior art. Hence, a therapeutic technique orally handed down from one generation to another by a tribe in Asia or the Pacific can still be patented in the US, despite its being publicly known for many years in the area of origin. This is why western-styled patent systems such that of the US are inherently not capable of recognizing nor protecting the TK of other countries. The solution then is to document these IPRs.

4. TRIPS as a Dilution of Farmers’ Rights Recognized by the Plant Breeder’s Rights System

TRIPS authorizes the registration of plant varieties either as a patent or an alternative sui generis system of IPR protection, or both. However, the TRIPS provision does not seem to contemplate a plant breeders’ right as authorized by the UPOV,



but that of a plant patent available in the US and Europe. Proof of this is the fact that the TRIPS provision referring to plant varieties is under the section on patents. Moreover, there is no provision similar to the UPOV's farmers' rights, except for the general exception on the use of patents.

The UPOV Convention, first signed in 1961, came into force in 1968 and has been revised in 1972, 1978, and 1991. According to WIPO (2006), the benefits of the UPOV System for small and medium enterprises are the following: 1) it lowers the "barriers to entry" into the breeding sector; 2) its simple and harmonized application system translates into lower costs and simplified filing procedures in foreign countries; and 3) the harmonized system of variety examination focuses simply on newness, distinctness, uniformity and stability.

The UPOV system, however, is perceived as easy to get but provides a weak IPR protection, and may not be applicable to all countries. Proof of this is the low rate of accession by countries. Many developing countries, however, including those in Asia, have promulgated or are in the process of enacting their own sui generis system for plant varieties, in some instances modeled after the UPOV model law. But they do not necessarily become members of the UPOV. TRIPS, on the other hand, provides some kind of a double protection for plant varieties, through a patent or a sui generis system.

BT CORN COMMERCIALIZATION IN THE PHILIPPINES: A SUCCESS STORY FOR TRIPS AND IPRS

The following successful commercialization process demonstrates the fact that with effective regulation, active agricultural biotechnology R&D and policy, and pervasive information and education campaign, TRIPS can have a positive impact on the agricultural trade and development of an Asian developing country such as the Philippines.

Bt Corn – An IPR, an Agricultural Biotechnology Product, and a Genetically Modified Organism (GMO), Rolled into One

Bt corn contains *Bacillus thuringiensis*, a foreign gene from the soil bacterium, which produces toxins that are toxic to the Asian corn

borer (ACB) *Ostrinia furnacalis* (Guenée), a predominant corn pest in the Philippines. The transformation event is known as Mon 810, which when effectively applied to the hybrid yellow corn variety, provides built-in resistance to the ACB. Before, there were ten Bt hybrid corn varieties accredited and recommended for commercial planting in the Philippines. These varieties changed with the Mon 810 transformation event, and Bt corn became the first genetically modified crop to get regulatory approval for commercial propagation in the country, after almost six years of trial and safety evaluation. Monsanto, one of the world's biggest agricultural biotechnology companies, owns two of these transformed varieties for commercial release in the Philippines. These are registered in the Philippines under the trademark "YieldGard® Corn Borer, and with commercial denominations DK 818YG and DK838YG, under the National Seed Industry Council's varietal registration system. The transformation event, as well as the methodology to produce this transgenic plant, is also patented in the US and China (<http://www.espacenet.com>).

Timeline of Critical Events Leading to its Successful Commercialization

The story began in 1990 when the International Rice Research Institute (IRRI), which was based in the Philippines, needed to import into the country a microorganism for its rice research. Motivated by the concern on the adverse effects of the possible accidental release of the organism, Filipino scientists got together and drew up a plan to address the concern through Executive Order (EO) No. 430. This presidential order also established the National Biosafety Committee to promulgate standards for the laboratory and field testing of imported microorganisms as well as the products of biotechnology and GMOs. In 1992, the Philippines ratified the Convention on Biological Diversity (CBD), providing impetus to its already existing biotechnology R&D program. To implement the CBD, EO No. 247 was also issued to manage bio-prospecting in the country. In 1995, the Philippines ratified the agreement establishing the WTO, and became one of its original members. In 1997, the Philippine Congress enacted Republic Act (RA) No. 8435, providing the framework for the modernization of Philippine agriculture and

fisheries, including the use of biotechnology. In the same year, the Philippine Congress also enacted the Intellectual Property Code of the Philippines (RA 8293), codifying all IPR laws in the Philippines and incorporating the provisions of the TRIPS Agreement. In recognition of the potential role of modern biotechnology in the development of the country, President Gloria Macapagal Arroyo issued a policy statement in 2001 to promote its safe and responsible use and of its products as one of the several means to achieve and sustain food security, equitable access to health services, and sustainable and safe environment and industry development. In 2002, the Department of Agriculture issued Administrative Order No. 8 providing for very comprehensive and detailed procedures for the importation, laboratory and field testing, and commercial release of GMOs.

Passing the Crucial Tests

The successful development of Bt corn in the Philippines was not easy, taking almost seven years to bring it from the laboratory to the field. According to Monsanto, the cost of having the technology pass all regulatory requirements in the Philippines — from laboratory to commercialization—is estimated at US\$ 300,000.00. Monsanto now claims that since 2002, their product has demonstrated its ability to improve both the yield and quality of grain that, in turn, increases growers' incomes. Of course, because it is new, the technology had more than its share of controversy. In fact, one of the authorized field trials was destroyed by a militant NGO in the Philippines.

Impact of Bt Corn on the Philippines' Agricultural Trade and Development

Gonzales (2005) assessed the socio-economic (transcendental) impact of this Bt corn during its initial phase of commercialization in the country. The impact evaluation, using five indicators, analyzed the performance of Bt corn seed users, particularly those using Monsanto's YieldGard® corn, relative to corn farmers using ordinary hybrid seeds, in five corn-producing provinces, for two seasons. The five indicators used were: yield, farm production cost, net farm income (profit), subsistence level to carrying capacity

ratio, and resource to cost ratios. Results confirmed Monsanto's claims that YieldGard® surpassed the yield performance of non-Bt corn in all yield farms (low and high) by 21%. The study likewise found that: 1) YieldGard® was more cost-efficient on farm at both low (11%) and high yield levels (14-23 %); 2) the net farm incomes of YieldGard® corn farmers exceeded those of their non-Bt corn counterparts by an average of 35%, escalating at low yield levels to 308%; 3) YieldGard® corn farmers had higher subsistence-carrying capacity, averaging 66%; 4) YieldGard® corn production was more cost-competitive by 17% than ordinary hybrid corn and had a global cost-competitive edge over non-Bt corn production by 16%; and 5) YieldGard® corn production can be globally cost-competitive as an export. (See Appendix Table 12.)

In plain language, while Bt corn seeds may be more expensive compared to other corn seeds, and could not be replanted, the yield increase more than offset the cost, also increasing the profits of corn farmers. The increase in yield and total corn production thereby reduced the corn imports of the Philippines. According to the Philippine Department of Agriculture (2004), corn output rose 17% to 5.4 million tons in 2004 from 4.6 million in 2003, and is expected to continue for the first quarter of this year (DA 2006). Accordingly, the corn importation of the Philippines decreased by 77% from 99,797 metric tons (mt) in 2003 to 22,911 mt in 2004 (FAOSTAT 2006). The Bt corn experience in the Philippines provides evidence that TRIPS is beneficial to a developing country like the Philippines, and for any country in Asia for that matter. But TRIPS will have to be supplemented by top-level policy, appropriate biosafety guidelines, and complementary regulatory systems.

The Philippine IPR system has specifically assured the owners of the Bt corn that it can be protected and commercialized in the country, giving them exclusive rights over their creations that now catalyze technology generation, and improve agriculture. Strengthened IPRs in the country not only benefited the owners of Bt corn but also offered smallholder Filipino farmers a better technology, and a practical and ecologically sustainable solution for them to increase their yields, thus improving their livelihoods and alleviating poverty. More importantly, Bt corn contributed to the improved performance of the country's corn sector. This

experience enabled the Philippines to become the fourth largest corn producer in Asia, growing about 2.5 million hectares of corn each year, thereby giving the country the distinction of being the first to commercially propagate Bt corn, a genetically modified crop, in Asia.

Through this technology, the government of the Philippines hopes to provide an economic boost to resource-poor Filipino farmers, whose corn yields are just a fraction of those in the United States, China, Indonesia, and Thailand (Appendix Table 10). As a compliment, the International Service for the Acquisition of Agri-Biotech Applications (ISAAA) has classified the Philippines as one of the 21 biotechnology mega countries planting genetically modified (GM) plants to 100,000 hectares or more.

PROPOSED ASIAN AGENDA FOR COMPLYING WITH AND BENEFITING FULLY FROM TRIPS

Whether Asian countries like it or not, globalization of trade is at hand, particularly for those who are members of the WTO. Since WTO rules govern a substantial majority of world trade, countries will eventually wish to become members of this international trade organization. WTO rules are unique in that they are not only legally binding among members, but also provide for effective dispute settlement mechanisms. The rules also provide legal procedures and means to ensure that member-countries comply or face effective trade sanctions. For Asian member-countries, there is no turning back. For those undergoing accession, global trade is inevitable. Although the WTO agreements, including TRIPS, allow it members to withdraw, nobody is withdrawing. On the contrary, the increasing number of countries acceding to the treaty provides proof that WTO is good for their interests, or they have no other choice. Regardless of what is the real reason, the global trade regime is now a reality. Fortunately for Asia, its biodiversity has given it an edge. The rapid developments in agricultural biotechnology and hybrid technology will be to its advantage. TRIPS should provide added impetus to its rapidly growing agricultural trade and development.

Based on the foregoing analysis of the impact of TRIPS on Asian agricultural trade and development, and the actual experience of the Philippines in the commercialization of Bt corn, which is both an agricultural biotechnology product and an intellectual property, this paper proposes the following strategies for Asian member-countries to be effectively compliant with TRIPS, and benefit from its full implementation beginning in 2006:

1. Comprehensive IPR Legislation and Enforcement, and Policy Advocacy on IPR, TRIPS, and Biotechnology

TRIPS provides not only minimum standards for IPR protection among its members, but also detailed guidelines for legislation to make it easy for existing or prospective members to comply. It set the minimum standards for acquisition, maintenance, and enforcement of IPRs, but it also expanded IPRs to include copyrights and industrial property, geographic indications, integrated circuits, and trade secrets; and by interpretation, plant patents or plant breeders' rights. TRIPS requires changes in the member-country's IPR acquisition, maintenance, and enforcement in these areas. Most of the developing countries in Asia have already amended, or are in the process of amending their IP legislation to comply with TRIPS. The least developed members are given until this year (2006) to comply with TRIPS.

IP legislation. For countries not automatically incorporating international law systems, and who have yet to develop effective IP legislations, the following considerations are suggested:

- a. IP legislations should be codified and should consider complementary and related areas such as biosafety regulations, the rights of indigenous peoples on their traditional knowledge and folklore, community IPRs, science and technology, and anti-trust.
- b. Proposed legislation should greatly encourage the participation of national stakeholders, including NGOs, to ensure a broader perspective and easier acceptance of the legislation by all concerned.



- c. The ability of developing countries to coordinate policy across governments in undertaking IP-related reforms is crucial to ensure that national IP reforms pursuant to TRIPS are properly joined up with related areas of national development policy.

Proposed IPR legislation may explicitly define agricultural biotechnology and hybrid crops technology. For new varieties, exceptions on the reuse of harvested seeds by farmers, and for further development of better plant varieties and animal breeds, may be included. A restrictive definition of the term “microorganism” may also be adopted. Countries that wish to develop biotechnology-related industries may wish to provide certain types of patent protection in this area. However, specific exceptions for plant breeding and research should be established. A clear exception from the patent or plant breeders’ right must also be included in the legislation to allow farmers’ reuse of seeds.

Legislation could also provide legal bases and resources for the establishment of digital libraries that would document and preserve traditional knowledge which can constitute prior art publications, thereby, preventing the patenting of traditional knowledge. To address bio-piracy, the obligatory disclosure in the patent application of the geographical source of genetic resources from which the invention is derived, could also be pushed in legislation. Appropriate sanctions should be applied if the patentee fails to disclose the source.

Effective IPR enforcement. For countries that automatically incorporate TRIPS, and those who already have IPR legislation, enforcement is a key issue. These countries should ensure that:

- a. their IP legislation and procedures emphasize, to the maximum possible extent, IPR enforcement first through administrative and civil actions, then through criminal actions, if necessary;
- b. enforcement procedures are transparent, fair and equitable to both parties, and ensure that injunctions and measures are not used unduly by IPR holders to block legitimate competition; and
- c. IP enforcement is improved by using public funds and donor programs to strengthen the legal and judicial systems.

Effective and comprehensive policy advocacy. TRIPS has provided Asia, especially its developing countries, the opportunity to further improve its capability to innovate and compete in the globalized world. Aside from the challenges of legislation, administration, and enforcement, in line with international obligations, and consistent with national development goals, it is also critical to advocate IPR policy, especially in the light of the hysteries brought about by the ambiguity of knowledge on the positive impact of TRIPS .

2. Changing the R&D Culture and Focusing on Agricultural Biotechnology

There is a need to change the R&D culture in Asian countries, particularly those in public R&D institutions, from a “publish or perish” attitude, to a “patent and publish” philosophy. This culture will help ensure that researchers’ or their sponsors’ IPRs will be protected. The patent application, whether successful or not, and the publication will also serve as prior art against any patent application in the same field of invention anywhere in the world. Contrary to doubts that IPR inhibits local research and interferes with the works of local research organizations and companies, the freedom to carry out research is, in fact, even safeguarded with the availability of IPR legal structures and mechanisms. In turn, the R&D cycle will be stimulated further by the profits earned from IPR commercialization, leading to better products and processes. After all, the monopoly authorized by IPR does not last forever, and is not automatically effective in all countries. Without IP protection, however, research-based companies would be unable to bear the risk of the major investment in R&D required to bring these technologies to the market.

Public research organizations have to redefine their role and upgrade their expertise in a changing world of new science, and new norms about the ownership, sharing, and use of the products of science. These organizations at different levels—national, regional and international—will have to develop innovative mechanisms to work with the private sector to access needed tools and technologies, recognizing the complementary goals, skills, and assets of each side. The public sector has critical assets in the form of germplasm and associated biological knowledge that are



increasingly important in the new science of genomics. However, to fully exploit these assets, the public sector must develop a capacity in IPR management and in business skills and clearly identify the value of its own assets in negotiations.

Market segmentation is likely to be a key element in public-private negotiations. And yet, although most public-private alliances today have been based on free access to proprietary technologies for non-competing markets, this is unlikely to be a sustainable strategy. The public sector realistically needs to think in terms of royalty payments (hopefully discounted) to the private sector in order to maintain a flow of up-to-date and relevant tools and technologies.

3. Active Participation in the Council for TRIPS

WTO agreements, including TRIPS, are works in progress. WTO encourages developing and least developed countries to play important roles in the negotiation process. Since decision-making in the WTO is by consensus, more Asian countries can influence amendments to these agreements in their favor, and should take the opportunity. Their active participation is essential to ensure fair and appropriate standard setting that is relevant to their different levels of development. To participate effectively, developing countries must have permanent representation in Geneva; assign appropriately staffed expert delegations to attend meetings and negotiations; provide adequate technical support for policy analysis; and put in place functional mechanisms for policy coordination and discussion in within their respective countries.

Several proposals have already been submitted to the TRIPS Council, which is responsible for monitoring the WTO members' compliance with their obligations under TRIPS. Developed countries specifically prompted the review of the TRIPS Agreement to address issues on geographical indications, and the patentability of biological inventions. There are, in addition, many proposals that go beyond such limited review.

Geographical indication. Two issues are debated, namely: creating a multilateral register for wines and spirits; and extending the higher (Article 23) level of protection beyond wines and

spirits. The TRIPS Agreement and current TRIPS work in the WTO take account of the diversity of the legal means to protect geographical indications. To date, debate has focused on mechanisms and modalities. In particular, there is doubt about whether a negotiating mandate exists to extend the higher level of protection available to wines and spirits to other geographical indications. As for establishing a multilateral system for registration, debate centers on the extent to which countries will be obliged to offer protection to registered geographical indications for wines and spirits. Those seeking lower protection are advocating that the system be used as a database, with the protection offered in specific instances determined by countries individually. However, those seeking higher protection are effectively calling for a global right once registration has occurred. Members remain deeply divided, however, with no agreement in sight, although they are ready to continue discussing the issue.

Review of Article 27.3 (b) and related issues. Begun in 1999, debates in the TRIPS Council have focused on how the TRIPS Agreement relates to the CBD, the protection of traditional knowledge and folklore, and other relevant new developments in this area such as community IPRs. The discussions have gone into considerable detail with a number of ideas and proposals for dealing with these complex subjects, including a) disclosure as a TRIPS obligation, b) disclosure through the World Intellectual Property Organization (WIPO), c) disclosure but outside patent law, and d) the use of national legislation, including contracts, rather than a disclosure obligation.

4. Regional or Bilateral Cooperation in IPR

This is essential to reduce IPR administration costs and increase efficiency. There are two important options open for regional/international cooperation:

Patent Cooperation Treaty (PCT). The first option is membership in the PCT and Madrid systems. The PCT membership system allows national patent offices to minimize search, examination, and publication tasks. It also allows domestic applicants to simultaneously file for patent application in all PCT members at relatively low cost. The Madrid system produces similar



advantages in trademark registration. Not all developing countries in Asia are PCT members.

Regional Organizations. Currently, there are four regional industrial property organizations in the developing world, namely the Eurasian Patent Office, with nine member-states from Eastern Europe and Central Asia; the Gulf Co-operation Council Patent Office, with six member-countries from the Arab region; the OAPI and ARIPO, with 16 and 15 member-states, respectively from the African region; and the six countries of the Andean Pact. The Association of Southeast Asian Nations has the Framework Agreement on IP Cooperation, but it does not cover all developing countries in Asia.

Regional organizations exist to complement national IP structures. Its disadvantage, however, is that membership in a regional system, depending upon its structure and built-in flexibility to cater to members' national interests, may make it more difficult for individual developing countries to apply IP regimes tailored to their needs. Asian countries need to weigh the pros and cons of regional and international cooperation, and choose the patent regime that is best suited to their national circumstances. In pursuing other multilateral and regional operation, care should be taken so as to avoid higher than minimum standards or TRIPS-plus type of commitments.

5. Human and Institutional Capacity-building on IPR

In addition to the lack of appropriate IPR legislation, many developing and least developed Asian countries do not have IPR expertise in their national academic, administrative, and governance structures. There is also inadequate awareness and familiarity with the IPR systems and instruments within the general public, research community, and among small and medium enterprises. Building the IP capability of one nation should therefore focus on promoting greater public awareness; enhancing human and institutional capacity in IP matters, most especially in the area of agricultural biotechnology; and developing modern infrastructure, including information technology. Developing nations should take an integrated approach to encourage more partnerships with donor agencies to build national capacities.

CONCLUSION

Like any other international agreement, or any law for that matter, TRIPS has its imperfections, which critics belabor. Nevertheless, TRIPS represents the existing global state of IP standards, and is legally binding on all its member countries. TRIPS is also backed by a very effective dispute settlement mechanism, with predictable trade sanctions. Of course, TRIPS is only one among the several multilateral agreements under WTO, which all have significant impacts on global trade. Aside from its effects on the agreements on agriculture, sanitary and phytosanitary measures, and technical barriers to trade, TRIPS has a direct impact on agricultural trade and development, particularly agricultural biotechnology. Its impact on agricultural trade is relatively more important for developing countries in Asia because agriculture is still a significant portion of many of its countries' GDP. In addition, many of the poor in Asia depend on agriculture for their livelihood. However, its biodiversity provides Asia a distinct advantage over its biodiversity-poor neighbors. Once it is able to catch up with its biotechnology-rich counterparts, this advantage cannot be reversed. And TRIPS, if fully exploited, can provide the needed leverage to ensure that this advantage is maintained.

The case of Bt corn in the Philippines provides evidence that TRIPS could be very beneficial; therefore, Asia — because of its built-in advantages such as its biodiversity, its huge population and markets, the importance of agriculture in its economy, and its rapid economic development — stands to benefit more from TRIPS, compared with its neighbors.

Finally, the best way of sorting out the confusion on the implications of TRIPS on Asian agricultural trade and development, and on other related concerns, is to consider these simple guides:

1. When agricultural goods with no IPR components are traded, TRIPS does not apply.
2. When agricultural goods with IPR components are not traded, TRIPS is irrelevant.
3. When agricultural goods with IPR components are traded, TRIPS is in force.

In other words, if the use of the IPRs does not



unjustly enrich any third party and prejudices the holder, there is no IPR infringement, and TRIPS cannot be used.

REFERENCES

- Asian Development Bank. 2001. *Agricultural Biotechnology, Poverty Reduction and Food Security*. Manila, Philippines:
- Bonilla, E. and S. Robinson. 2003. "Biotechnology, Trade, and Hunger". *Biotechnology and Genetic Resource Policies*. Brief 2 (January 2003): 2. IFPRI.
- Clive, James. 2005. "Global Status of Biotech Crops/GM Crops: 2005". ISAAA Briefs 34-2005. Ithaca, New York: ISAAA <<http://www.isaa.org>> (accessed 8 March 2006).
- Convention on Biological Diversity (CBD). 2006. Secretariat of CBD. United Nations Environment Programme. Parties to the Convention on Biological Diversity/Cartagena Protocol on Biosafety <<http://www.biodiv.org>> (accessed 13 March 2006).
- Commission on Intellectual Property Rights (CIPR). 2002. "Integrating Intellectual Property Rights and Development Policy". p.16.
- Commission of Genetic Resources for Food and Agriculture (CGRFA). 2006. The International Treaty on Plant Genetic Resources for Food and Agriculture <<http://www.fao.org/ag/cgrfa/itpgr.htm>> (accessed 13 March 2006).
- Consumer Unity and Trust Society (CUTS) International 1999. "TRIPs, Biotechnology and Global Competition" <<http://www.cuts-international.org/1998-2.htm>> (accessed 28 February 2006).
- Department of Agriculture (DA), Philippines. 2006. "DA Expects an Increase in Rice and Corn Production for the First Quarter" <<http://www.da.gov.ph>> (accessed 15 March 2006).
- Dhlamini, Z., C. Spillane, J.P. Moss, J. Ruane, N. Urquia and A. Sonnino. 2005. "Status of Research and Application of Crop Biotechnologies in Developing Countries. Preliminary Assessment". Food and Agriculture Organization, pp. 44 and 46.
- Food and Agriculture Organization (FAO). 2002. *Rice in World Trade* <<http://www.fao.org>> (accessed 16 March 2006).
- FAOSTAT data. 2005 <<http://www.faostat.org>> (accessed 20 March 2006).
- Gonzales, L.A. 2005. *Harnessing the Benefits of Biotechnology – The Case of Bt Corn in the Philippines. Society Towards Reinforcing Inherent Variability for Enrichment*. Laguna, Philippines, p 1.
- GRAIN. 1998. "10 Reasons Why Not to Join UPOV". Issue 2 (May 1998).
- _____. 2002. "Traditional Knowledge of Biodiversity in Asia-Pacific". October 2002 <<http://www.grain.org>> (accessed 21 February 2006).
- Helfer, L.R. 2004. "Regime Shifting: The TRIPS Agreement and New Dynamics of International Intellectual Property Lawmaking". *Yale Journal of International Law*, 29: 23 <<http://www.espacenet.com>> (accessed 15 March 2006).
- India's Office of the Controller General of Patents, Designs and Trademarks. 2001. *Patents Statistics*. <<http://www.ipindia.nic.in>> (accessed 9 March 2006).
- Intellectual Property Corporation of Malaysia. 2006. "Patent Application Received and Granted From year 2000 until 2006". <<http://www.mipc.gov.my/>> (accessed 18 March 2006).
- Intellectual Property Office of the Philippines. 2006. *Statistical Report* <[http:// ipophil.gov.ph](http://ipophil.gov.ph)> (accessed 18 March 2006).
- International Service for the Acquisition of Agri-Biotech Applications (ISAAA). 2005. "Global Status of Biotech Crops/GM Crops: 2005 by Clive James in 2005. ISAAA Briefs 34-2005. Accessed at <http://www.isaa.org> on 8 March 2006.
- Kryder, R.D., S.P. Kowalski, and A.F. Krattiger. 2000. "The Intellectual and Technical Property Components of pro-Vitamin A Rice (Golden Rice Tm): A Preliminary Freedom-To-Operate Review". ISAAA Briefs no. 20. Ithaca, New York: ISAAA, p 5.
- Mayer, J. E. 2003. *AgBiotechNet* 2003. 5 (March, ABN 108): 2.
- Korean Intellectual Property Office. 2006. *Annual Report. IP Landscape and Trend Analysis* <<http://www.kipo.go.kr/eng/index.html>> (accessed 14 March 2006).
- Ministry of Commerce and Industry, India. 2006. "India's Share of World Market for Basmati Rice is 53%". <<http://commerce.nic.in>> (accessed 16 March 2006).
- Panutampon, P. and W. Lianchamroon. 1998. "Biopiracy, TRIPS and the Patenting of Asia's Rice Bowl". *Thai Development Newsletter*, 34 (January-June): 51-57.

- Pardey, P.G., B.D. Wright, C. Nottenburg, E. Binenbaum, and P. Zambrano. "Intellectual Property and Developing Countries: Freedom to Operate in Agricultural Biotechnology." In P.G. Pardey and B. Koo (eds.), *Research at a Glance—Biotechnology and Genetic Resource Policies*. IFPRI, p 1.
- Peoples, L. 2004. *International Trade in Agricultural Products: A Research Guide*. <<http://www.llrx.com/features/agproducts.htm#fn2#fn2>> (accessed 10 March 2006).
- Sriboonchitta, S. 2004. "Estimation of Stochastic Production-Frontiers with Self-Selectivity: Jasmine and Non-jasmine Rice in Thailand" <<http://www.uq.edu.au>> (accessed 16 March 2006).
- State Intellectual Property Office of the Republic of China. 2006. *Annual Report 2004*. <<http://www.sipo.gov.cn>> (accessed 10 March 2006).
- Thailand Department of Intellectual Property. 2006. "IP Statistics". <<http://www.ipthailand.org>> (accessed 16 March 2006).
- United Nations Conference on Trade and Development (UNCTAD) and International Center for Trade and Sustainable Development (ICTSD). 1996. *Project on IPRs and Sustainable Development*, pp. 8-11.
- _____. 2001. "Intellectual Property Rights and Development". Policy Discussion Paper, p 10.
- United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2004. *Key Indicators On World GDP, Population and GERD, 2002* <<http://www.unesco.org>> (accessed 24 March 2006).
- World Intellectual Property Organization (WIPO). 2006. "Getting the Most out of Your New Plant Variety".
- _____. 2006. *Paris Convention for the Protection of Industrial Property*. <http://www.wipo.int/> (accessed 25 February 2006)
- WTO. 2004. "Trade and Policy Developments – Recent Trends in International Trade and Policy Developments". *World Trade Report*. p. 21 <<http://www.wto.org>> (accessed 26 February 2006).
- _____. 2005. *World Trade Developments in 2004 and Prospects for 2005*. p. 15. <<http://www.wto.org>> (accessed 26 February 2006). Appendix Table 1. Salient features of TRIPS.

Appendix Table 1. Salient features of TRIPS.

Scope (Art. 1)	Copyright and related rights; trademarks; geographical indications; industrial designs; patents; layout designs of integrated circuits; undisclosed information.
General obligations/basic principles	
National treatment (Art. 3)	Requires all Members to treat nationals of other countries no less favorably than their own nationals on all matters concerning IPRs, subject to certain exceptions already provided in conventions/treaties related to IPRs.
Most-favored-nation treatment (Art. 4)	Advantages, privileges granted by a Member to the nationals of any other country should be extended unconditionally to the nationals of all other Members.
Exhaustion of intellectual property rights (Art. 6)	For the purposes of dispute settlement, nothing in the Agreement shall be used to address the issue of exhaustion of IPRs, provided there is compliance with national treatment and most-favored-nation treatment.
Basic objectives and principles (Arts. 7 & 8)	The protection and enforcement of IPRs should contribute to the promotion of technological innovation and to the transfer and dissemination of technology. They should also contribute 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. The Agreement 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 socioeconomic and technological development. At the same time, appropriate measures can be taken in order to prevent the abuse of IPRs or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology.
Standards	
<i>Copyright and related rights</i>	
Relation to the Berne Convention (Art. 9)	All members are required to comply with the substantive provisions of the Bern Convention, except for the obligation on moral rights. Eligible works must be protected on the basis of their expression as a literary work, not on the basis of ideas, procedures, methods of operation or mathematical concepts as such.
Protection of computer programs and compilation of data (Art. 10)	Computer programs are protected as literary works. Compilations of data are also protected under the Agreement.
Rental rights (Art. 11)	Concerning computer programs, Members shall provide to authors the rights to authorize or to prohibit the commercial rentals of their works to the public. As for cinematographic works, this obligation exists only if commercial rental has led to widespread copying which is materially impairing the reproduction rights.
Protection of performers, producers of phonograms and broadcasting organizations (Art. 14)	Specific provisions are introduced for the protection of performers, producers and broadcasting organizations, and the term of protection is extended (at least 50 years for performers and producers, 20 years for broadcasting organizations) (as compared to the Rome Convention).
Trademarks	



Protection of service marks (Arts. 15 and 16)	Provides equal treatment to trade and service marks. Under certain circumstances also provides protection against use of dissimilar goods and services. No cancellation for reason of non-use (if use required to maintain a registration).
---	---

Protection of well-known marks (Art. 16)	Well-known marks must be protected, even when not used in a country. In determining whether a trademark is well known, the knowledge of the trademark in the relevant sector of the public is to be taken into account (Art. 16.2).
--	---

Elimination of restrictions on use of trademarks (Art. 20)	Use of trademarks is not to be encumbered by special requirements, such as use with another trademark.
--	--

Geographical Indications

Geographical names (Art. 22)	Provides means to prevent use of geographical direct or indirect names from misleading the public as to the true origin of the good, or which constitutes an act of unfair competition.
------------------------------	---

Additional protection (Arts. 23 and 24)	With regard to wines and spirits, protection must be provided even where there is no threat of the public being misled as to the true origin of the good. Negotiations are being undertaken with respect to the establishment of a multilateral system of notification and registration for wines.
---	--

Industrial designs

Term of protection (Arts. 25 and 26)	For industrial designs, a protection of at least 10 years is required. Special provisions on textile designs leave each Member to decide whether to provide protection through copyright law or industrial design law.
--------------------------------------	--

Patents Scope of protection (Art. 27)	Protection should be available for any inventions, whether products of processes, in all fields of technology. Inventions that threaten public order or morality need not be patented, provided the commercialization of such inventions is also prohibited. Most biotechnological inventions must also be protected, but plants and animals and essentially biological processes for the production of plants and animals (excluding micro-organisms and micro-biological processes) may be exempted from patent protection.
---	---

Non-discrimination (Art. 27.1)	The Agreement requires non-discrimination in the granting of patents and the enjoyment of rights, in relation to technology, the place of invention and whether patented products are imported or locally produced.
--------------------------------	---

Term of protection (Art. 33)	The duration of protection must not be less than 20 years from the date of filing the application.
------------------------------	--

Other uses without authorization of the patent holder (Art. 31)	In principle, no restrictions are placed on granting compulsory licenses and government use of patents. However, these practices must respect a number of conditions to prevent patent-holders' rights being undermined.
---	--

Authorization of such use should be considered on its individual merits. The detailed conditions for granting these authorizations are listed in the Agreement.

Process patents (burden of proof) (Art. 34)	Reversal of the burden of proof in civil proceedings relating to infringements of process patents is to be established in certain cases.
---	--



Plant varieties (Art. 27)	Plant varieties, including seeds, must be protected through patents or alternative sui generis means.
Layout designs of integrated circuits (Arts. 35-37)	Substantive provisions of the Washington Treaty must be respected along with a number of additional obligations; protection includes not only the protected chip, but also articles incorporating it; and the term of protection must be 10 years. An "innocent infringer" must be free from liability, but once he/she has received notice of infringement, he/she is liable to pay a reasonable royalty.

Undisclosed information and test data (Art. 39)

Protection of trade secrets	Undisclosed information (or trade secrets) must be protected against acquisition, use or disclosure in a manner contrary to honest commercial practices. To benefit from such protection, information must be secret, have commercial value owing to such secrecy, and have been subject to reasonable steps to keep it secret.
Protection of test data	Test data provided by a company in order to gain marketing approval for pharmaceutical and agricultural chemical products must be protected against unfair commercial use; they must also be protected against disclosure, except where necessary to protect the public, or unless steps are taken to ensure that the data are protected against unfair commercial use.

Anti-competitive practices in contractual licenses (Art. 40)

Licensing practices	The Agreement recognizes that countries may specify in their domestic legislation the commercial licensing practices that constitute an abuse of intellectual property protection, and take steps to address these through appropriate measures.
Consultations among members	Members must cooperate with each other, including through the provision of information, in investigations of alleged abuse of intellectual property rights that have international dimensions.

Enforcement

General obligations (Art. 41)	Members must provide effective means of action for any right holder, foreign or domestic, to secure the enforcement of his/her rights, while at the same time preventing abuse of the procedures.
Procedures (Arts. 43-50)	The Agreement specifies procedures for civil and judicial action, including means to produce relevant evidence. Civil remedies that must be available should include injunctions, damages and destruction of infringing goods, or disposal of these outside the channels of commerce. Provisional measures must be available to prevent infringing activity and to preserve relevant evidence. Judicial authorities must have the authority to adopt provisional measures.
Customs cooperation	Right holders must have the means to obtain the cooperation of the customs authorities in preventing imports of pirated copyright goods and counterfeit trademark goods.
Criminal procedures (Art. 61)	Criminal procedures and penalties must be available in case of willful trademark-counterfeiting or copyright piracy on a commercial scale.
Indemnification of the defendant (Art. 48)	Compensation for the abuse of enforcement measures are specified, including payment of defendants' expenses, which include appropriate attorney's fees.
Acquisition and maintenance of IPRs (Art. 62)	Procedures or formalities for obtaining intellectual property rights should be fair, reasonably expeditious, not unnecessarily complicated or costly, and generally sufficient to avoid impairment of the value of other commitments.



Dispute settlement (Arts 63 and 64)	The new WTO dispute settlement procedures will apply to the TRIPS Agreement.
Faster procedures	Dispute settlement procedures will be faster than in the GATT because of time limits set for each stage of the process. There is no scope for interested parties to block the process of the adoption of recommendations of panels.

Transitional arrangements (Art. 65)

Developing countries	One-year transitional period for all countries to apply the Agreement. Developing countries can delay application of the Agreement for another four years, except for national treatment and MFN obligations. These countries are entitled to an additional five-year period for introducing product patents in areas of technology (pharmaceuticals and agricultural chemicals) that are not protected at the date of application of the Agreement. This 10-year delay in the implementation of these provisions should be seen in conjunction with Art. 70.8 of the Agreement, which provides, in respect of pharmaceutical and agricultural chemical products, the following arrangements: any Member who does not make available, as of 1 January 1995, patent protection for the pharmaceutical and agricultural chemical inventions must accept the filing of applications for patents for such inventions (establishment of a 'mailbox' for patent applications claiming such product patents), and must do so from 1 January 1995, even if it is a country which may delay the application of the Agreement, as indicated above. Once the Agreement becomes applicable in that country, it must take a decision in respect of the application (either reject it or grant a patent), but, in doing so, it must apply (retroactively) the criteria of patentability as laid down in the Agreement. If its decision is to grant a patent, that patent will be available for the remainder of the term (Art. 70, para. 8). However, an "exclusive marketing right" (for a period of five years) must be granted concerning the invention which is the subject matter of the application if, after 1 January 1995, in another country a patent application has been filed and a patent granted for that product and marketing approval obtained in such other Member (Art. 70, para. 9).
Least developed countries	Least developed countries are entitled to delay application of the Agreement, except for national treatment and MFN until 1 January 2006.
Technical Cooperation	The Agreement calls upon developed country Members to provide technical and financial assistance in favor of developing country Members on mutually agreed terms and conditions.

Source: UNCTAD (1996).



Appendix Table 2. Annual percentage change of GDP and trade developments in Asia, 2000–2004.

	Asia					Developing Asia ^a				
	2000–2004	2001	2002	2003	2004	2000–2004	2001	2002	2003	2004
GDP	3.3	2.2	2.6	3.8	4.8	5.2	4.4	5.8	5.3	5.3
Merchandise										
Exports (value)	10	-9	8	18	25.0	12	-7	10	20	27.0
Imports (value)	10	-7	6	19	27.0	12	-7	9	21	30.0
Exports (volume)	8	-3.5	11	11.5	14.0	10.5	-1.0	13.0	14.5	16.0
Imports (volume)	8	-2.5	8	13	14.5	9.5	-2.5	10	15	16.5
Commercial services										
Exports (value)	10	-1	7	9	27.0	11	1	9	8	28.0
Imports (value)	8	-3	5	8	25.0	11	0	7	10	27.0

^a defined as Asia excluding Japan, Australia, and New Zealand. Adopted from WTO (2005).

Source: WTO (2005).

Appendix Table 3. Comparison of GDP, selected regions, 2001–2004.

Region	2001	2002	2003	2004
United States	0.8	1.6	2.7	4.2
North America	0.8	1.7	2.6	4.1
Canada	1.8	3.4	2.0	2.8
Europe	1.6	1.2	1.0	2.3
Africa	3.5	3.4	4.5	4.4

Source: WTO (2004).

Appendix Table 4. Share of agriculture in GDP, 1990–2004.

Country	1990	2000	2004
East Asia			
China, People's Republic of	27.0	16.3	15.2
Hongkong, China	0.2	0.1	0.1
Korea, Republic of	8.0	4.3	3.3
Mongolia	15.2	29.1	21.3
Southeast Asia			
Cambodia	55.6	39.5	36.0
Indonesia	19.4	15.6	15.4
Lao PDR	61.2	52.5	48.6
Malaysia	15.0	8.4	9.1
Myanmar	57.3	57.2	54.6
Philippines	21.9	15.8	15.3
Singapore	0.4	0.1	0.1
Thailand	12.5	9.0	9.9
Vietnam	38.7	24.5	21.8
South Asia			
Afghanistan	35.7	57.0	38.4
Bangladesh	29.4	24.6	20.2
Bhutan	43.2	28.5	26.1
India	31.3	24.6	21.1
Maldives	-	-	-
Nepal	50.6	39.6	38.7
Pakistan	26.0	26.2	23.1
Sri Lanka	22.9	19.9	17.8
Central Asia			
Azerbaijan	29.3	17.1	12.3
Kazakhstan	34.0	8.1	7.9
Kyrgyz Republic	33.6	36.7	36.6
Tajikistan	33.3	29.4	24.2
Turkmenistan	18.0	22.9	23.5
Uzbekistan	33.1	34.4	31.1
Pacific DMCs			
Fiji Islands	22.2	17.8	15.9
Timor Leste	29.8	25.9	30.5

Source: ADB (2005).

Appendix Table 5. Merchandise exports of Asia by product, 2000–2004.

	Value (in billion dollars)	Share in exports of Asia (%)		Share in world exports (%)		Annual percentage change (%)			
	2004	2000	2004	2000	2004	2000-04	2002	2003	2004
Total merchandise exports	2388.4	100.0	100.0	26.4	26.8	10	8	18	25
Agricultural products	143.1	6.1	6.0	18.3	18.3	9	9	11	18
Food	111.7	4.7	4.7	17.9	17.8	10	9	10	18
Fish	24.3	1.2	1.0	36.4	34.9	6	4	7	15
Other food products	87.4	3.5	3.7	15.3	15.7	11	10	11	19
Raw materials	31.4	1.4	1.3	19.8	20.1	7	8	16	18

Source: WTO (2004).

Appendix Table 6. Share of agricultural products in trade in total merchandise and in primary products by region, 2004.

	Exports	Imports
	Percent	
<i>Share of agricultural products in total merchandise</i>		
World	8.8	8.8
North America	9.9	6.2
South and Central America	28.9	9.4
Europe	9.1	9.7
Commonwealth of Independent States	9.0	13.7
Africa	12.1	14.5
Middle East	2.4	11.1
Asia	6.0	8.4
<i>Share of agricultural products in primary products*</i>		
World	37.9	37.9
North America	49.8	30.8
South and Central America	46.7	34.2
Europe	54.8	45.4
Commonwealth of Independent States	14.4	53.1
Africa	17.0	54.0
Middle East	3.1	64.3
Asia	43.7	30.2

* products include: wheat, milk and live animals, bread, butter and meat, chocolate, sausages, wines, spirits and tobacco products, cotton, wool and silk, and raw animal skins destined for leather production.

Source: WTO (2004)

Appendix Table 7. Status of research and application of crop biotechnologies, developing Asia. 2005.

Technique	C	T	E	U	N
Microbial techniques	-	-	20	6	7
Tissue culture	18	9	92	64	10
Molecular markers	-	-	33	28	9
Diagnostic techniques	-	-	7	4	7
GMO with pathogen resistance	2	19	35	14	9
GMO with pest resistance	3	16	17	14	7
GMO with herbicide resistance	-	5	-	6	4
GMO with abiotic stresses	-	5	7	6	6
GMO with improved quality traits	2	3	27	4	8
GMO with multiple resistance	-	3	2	-	3

C: technology used on a routine basis and products available in the market; T: results being tested; E: number of activities at experimental level (including laboratory of glasshouse activities; U: activities in unknown phase; N: number of countries involved

Source: Dhlamini et al. 2005)



Appendix Table 8. Status of GM crops in 2005, Asia.

Country	Area Planted (million ha)
China	3.3
India	1.2
Philippines	0.1
Iran	<0.1
TOTAL	<4.7

Source: James (2005).

Appendix Table 9. Comparison of patent applications, 1999–2004.

Year	US	Europe*	Japan	Developing Asia**
1999	288,811.00	103,944	405,655	158,644
2000	315,015.00	100,650	446,865	753,242
2001	345,732.00	108,902	439,175	342,410
2002	356,513.00	123,892	421,044	390,850
2003	366,043.00	145,322	413,092	454,256
2004	382,139.00	149,939	423,081	517,514
Total	2,054,253.00	732,649	2,548,912	2,616,916

Source: US, Europe, Japan, and Asian Patent offices

* based on record of 24 EPO members only

** based on patent records of Thailand, Indonesia, Korea, India, China, Singapore, Philippines, and Malaysia



Appendix Table 10. WTO member countries, and observers developing Asia.

Country*	Date of Accession	Membership to other International Treaties/Conventions						
Members		CBD	WIPO	PCT	PC	MP	ITPGRFA	UPOV
Armenia	5 February 2003	x**	x	x	x	x		
Bahrain, Kingdom of	1 January 1995	x	x	x		x		
Brunei Darussalam	1 January 1995		x					
China	11 December 2001	x**	x	x	x	x		x
Fiji	14 January 1996	x*	x					
Georgia	14 June 2000	x	x	x	x	x		
India	1 January 1995	x**	x	x	x		x	
Indonesia	1 January 1995	x**	x	x	x		x	
Israel	21 April 1995	x	x	x	x			x
Jordan	11 April 2000	x**	x		x		x	x
Korea, Republic of	1 January 1995	x	x	x	x	x		x
Kuwait	1 January 1995	x	x				x	
Kyrgyz Republic	20 December 1998	x**	x	x	x	x		x
Malaysia	1 January 1995	x**	x	x	x		x	
Mongolia	29 January 1997	x**	x	x	x	x		
Oman	9 November 2000	x**	x	x	x		x	
Pakistan	1 January 1995	x	x		x		x	
Philippines	1 January 1995	x	x	x	x			
Qatar	13 January 1996	x	x		x			
Saudi Arabia	11 December 2005	x	x		x		x	
Sri Lanka	1 January 1995	x**	x	x	x			
Singapore	1 January 1995	x	x	x	x	x		x
Chinese Taipei	1 January 2002							
Thailand	1 January 1995	x**	x				x	
Turkey	26 March 1995	x**	x	x	x	x	x	
United Arab Emirates	10 April 1996	x	x	x	x		x	
Vietnam	1 January 2007	x		x	x	x		x
Observers	Azerbaijan, Bhutan, Iran, Iraq, Kazakhstan, Lao People's Democratic Republic, Lebanese Republic, Tajikistan, Uzbekistan, and Yemen.							

Source: CBD(2006); FAO (2006); WIPO (2006); WIPO (World Intellectual Property Organization); PCT (Patent Cooperation Treaty; PC (Paris Convention; MP (Madrid Protocol); ITPGRFA (International Treaty on Plant Genetic Resources for Food and Agriculture

*List of countries based on Asian countries included in FAO database.

** ratified Cartagena Protocol

Appendix Table 11. Bioprospecting cases in Asia.

Country	Biological Resource	Nationality of Bioprospector	Notes
China	Bitter Melon (<i>Momordica charantia</i>)	US	US Patent No. 5484889
China	Xi Shu/Happytrees (<i>Camptotheca lowreyana</i>)	US	US Patent No. PP11,959
Malaysia	Bintangor tree (<i>Calophyllum lanigerum</i>)	Singapore, US	US Patents including No. 6420571, 6369241, 6160131 and 6277879
Pakistan	Basmati Rice (<i>Oryza sativa</i>)	US	US Patent No. 6274183 and 5663484
Philippines	Soil microbes	US	The multinational company Eli Lilly has earned billions of dollars from the drug, erythromycin, sold under the brand name «Ilosone», developed from an antibiotic isolated from a soil sample that a Filipino scientist Abelardo Aguilar collected in his home province of Iloilo. Neither Aguilar nor the Philippines received any royalties.
Philippines	Ilang-ilang (<i>Cananga odorata</i>)	France	The use of the extracts from ilang-ilang in the cosmetic industry is perhaps as old as perfume in France. There are several perfumeries in France that have used and continue to use it in their products.
Philippines	Banaba (<i>Lagerstroemia speciosa</i>)	Japan, US	US Patent No. 5980904
Philippines	Nata de coco	Japan, US	US Patent No. 6280767, 6140105, 5962277 and 5,795,979
Philippines	Snails (<i>Conus</i>)	US	US Patent No. 5,006,360 and 4774095 US Patent No. 6369193, 6344551, 6197535, 6153738, 6077934, 5633347, 5595972, 5589340 and 5514774
India	Turmeric (<i>Curcuma longa</i>)	US	US Patent No. 5401504, 5135796 and 5047100
India	Neem (<i>Azadirachta indica</i>)	US	Several US Patents including No. 5420318, 5391779 and 5371254; the US multinational company W.R. Grace's EPO Patent No. 0426257
India	Guggul (<i>Commiphora mukul</i>) see Box: Gugulipid	US	US Patent No. 6,113,949 and US Patent Application 20020018757
Thailand	Plao-noi (<i>Croton sublyratus</i>)	Japan	In 1975 Sankyo of Japan extracted the active ingredient of the Thai local plant to produce the patented product Kelnac.
Sri Lanka	Kothala himbutu (<i>Salacia reticulata</i>)	Japan, US	Takama System, Ltd. (Yamaguchi, JP)'s US Patent No. 6,376,682; Shaman Pharmaceuticals, Inc. (South San Francisco, CA)'s US Patent No. 5,691,386

Source: (Grain, 2002).

Appendix Table 12. Comparative performance of β t versus non- β t corn by province by season and by indicator, Philippines.

Indicators	Camarines Sur, Bukidnon, Misamis Oriental, South Cotabato WS 2003			Isabela DS 2003-2004			All Provinces/ Seasons		
	Performance			Performance			Performance Ratio		
	Bt/Non-Bt (%)			Bt/Non-Bt (%)			Bt/Non-Bt (%)		
	Low Yield	High Yield	Both Yield Levels	Low Yield	High Yield	Both Yield Levels	Low Yield	High Yield	Both Yield Levels
Yield (mt/ha) 24	18	20	4	20	23	(14)	19	21	
Farm Production costs (P/kg)*	(27)	(23)	(24)	5	(15)	(14)	(11)	(19)	(21)
Net Farm Income (P/kg)	623	35	62	(6)	12	12	308	24	38
Subsistence level Carrying Capacity Ratio	800	60	94	(2)	33	37	399	47	66
Global Competitiveness (RCRs)*									
Import Trade Scenario	(36)	(20)	(25)	(0)	(10)	(8)	(18)	(15)	(17)
Export Trade Scenario	(36)	(20)	(25)	2	(9)	(7)	(17)	(14)	(16)

* Figures in parenthesis should be interpreted as cost and efficiency savings

Source: Gonzales (2005)