

## Intellectual Property Rights and Trade Liberalization in Agriculture: Impact on Developing and Underdeveloped Countries

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### Abstract

*The subject matter of intellectual property rights (IPR) are not part of the negotiation Agreement of Agriculture, However, it has implications for agriculture poverty, trade and food security in developing and underdeveloped countries. This link is mostly related to technology. Technological change has played an important role to expanding world agricultural production during the second half of the twentieth century, especially in the last few decades. Increasing in production volume has not depended on bringing new lands under cultivation, in contrast growth in agricultural production substantially linked research and development investments and the decisions of agricultural policy of the political institutions. As a result, this is a fact that transformation of agriculture policy alters the agricultural production and agricultural trade indirectly. Meanwhile, a key technological development has been the emergence of increased mechanization and the introduction of effective pesticides, herbicides, fungicides and biotechnology or so-called Biotech Crops and genetically modified crops. These products have led to a heated debate, related to their impact on future food production, and on poverty and hunger. Another debate on the issue, has been how to affected agricultural trade of underdeveloped and developing countries. Because, world agricultural trade has been improved and enlarged by this rapid technological change. Furthermore, new agricultural policies and trade agreements has reorganized its global trade. The most important of them, The World Trade Organization (WTO) that aimed at establishing a trade policy system where free trade rules applied in world agricultural trade and agriculture sector. The other one, TRIPS (Trade Related Aspects of Intellectual Property Rights) that ensuring the development of new agricultural techniques. However, the impact of these policies in developing countries is debatable whether positive or not.*

**Keywords:** Intellectual Property Rights, Foreign Trade Policy, Agricultural Policies, Trade Liberalization

**JEL Classification:** O3, F1, F5, Q1

### 1. Introduction

In the last half century, technological change within global agriculture has generated substantial increases in yields and productivity. Knowledge and technologies flowing from innovations in the basic science of biology “now called as biotechnologies” have had a profound influence on economic developed and will continue to be important for the future development of the industry. Some 40% of the world's market economy is based upon biological products and processes (Phillips, Khachatourians, 2005). 10% of the world's crop lands were planted with biological crops in 2010 also 48% of biological crops grown worldwide were grown in developing countries (Clive, 2010).

Biotechnologies offers are a great opportunity to meet the nutritional needs of growing world population. It brings a new approach to control of pest and disease. Moreover, it will provide crops of improved nutritional quality and bring about increased yields. Biotechnology is not possible to have a complete solution to agriculture problems, but in the future it may play an important role for sustainable agriculture (Richer, 1999). Although this is true for industrialized countries, it's difficult to take advantage of the underdeveloped countries.

Technological differences and supported by its intellectual property would lead to monopolization and may increase the gap between rich and poor. Therefore agricultural revolution should spread all over the world and be sharing new production technologies or be provided an incentive to the innovators.

More generally, expansion and globalization of international trade and competition increased foreign direct investment, and increasing international pressure are compelling protection of intellectual property rights in many developing countries. On the other hand, in this process, these countries face a rapid rise in the number of IPR-related disputes and sanctions involving their own industries, plant genetic material and uses of indigenous knowledge. However, different opinions on this subject are available. According twosome opinions that developing countries with effective IPRs will attract more research and development spending, particularly from the private sector. According to some other, IPR amounts to economic colonialism (Lesser, Horstkotte-Wesseler, Lele, Byerlee, 2000, pp.1). If we look at the change in the world agricultural production, trade and gap between rich and poor countries, the second opinions is more likely. The World Bank plays supporting role in this process. As a result, issues of IPR in agriculture are complex, more than in any other sector, particularly pertaining to developing countries.

## ***2. Intellectual Property Rights (IPRs) in Agriculture***

Intellectual property is a broad term used to cover patents, designs, trademarks, copyright, and trade secrets. Of course all of them also apply in agriculture and food sector, but in addition include “plant variety rights” and “plant breeder’s rights”.

According to mainstream economics as we know, the necessary condition for optimal development is the existence of complete information, perfectly competitive market and no barriers entry to market. Also, over the long run, development requires rising productivity growth, which flows from investment in the search for innovation (Phillips, Stovin, 2000, pp.2). But at same time, As Schumpeter (1954) noted that, perfect market and flow to complete information are impede to innovation. Therefore, we may assume that direct relationship between IPRs and investment. Because, the nature of IPRs that supports innovation. IPRs strengthen the incentive to invest which provides greater opportunities to firms by protection through innovative ideas. In this way, companies that create innovation may achieve monopoly power in the market for a predetermined time. This will be encouraging firms to innovate, if IPRs provides the guaranteed. In this manner, successful IPRs and innovation will reinforce market power for companies.

We also illustrate the same approach in agriculture sector within the framework of mainstream economics. However the issues of IPR in agriculture are complex, more than in any other sector, particularly developing countries, because of its unique characteristics of agricultural structures. First, a large number of poor households in developing countries derive their livelihood from resource-poor areas with difficult agro-climatic conditions. In addition, agriculture is very important for developing countries in terms of economic growth, international trade, poverty alleviation, food security and environmental sustainability. On the other hand, agricultural sector of developing countries faces a dual challenge. The first challenge is to sustain and enhance the quality of natural resources, including germplasm, as the only way to meet the growing domestic demand and international competition. The second challenge is to ensure continued free access for the poor to emerging technologies while conserving vital germplasm for use by plant breeders (Lesser, Horstkotte-Wesseler, Lele, Byerlee, 2000). The main reason for these problems as the process of the WTO's, authority of intellectual property rights in agriculture.

## ***3. IPRs and the TRIPs Agreement***

It is clear that the regulations of intellectual property rights starting with WTO will create serious problems among the countries depending on the differences in their development. The first of these is the fact that developed countries are not limited by the regulations of intellectual property rights in the development process<sup>1</sup>.

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<sup>1</sup> Empirical researches indicate that protection of weak quality intellectual property rights will be beneficial until the industry of the countries, having a low level of technology capacity, comes to such a level that it derives benefit from the protection of intellectual property rights. The majority of developed countries have allowed the imported inventions to be secured by patent by their own citizens. Holland cancelled its patent law dated 1817 in 1869, accepted the patents as other monopolies and put into force again in 1919 as a result of the pressure from its neighbours. Before 1852, Britain, Austria and France are also the examples

Although the technology quality has been changed, the examples about the developed countries experiences make the appropriateness of the standard intellectual property right application a serious matter of debate in terms of the countries having different capacities of income and technology. Second is the heavy burden created for the underdeveloped ones to make copyright and license payments for intellectual property. The underdeveloped ones in the position of being a technology or intellectual property importer need technological enhancement in order to obtain products creating added-value. The regulation creates unfair competition as well as great expense. Preventing to use technology for the products with high added value prevents the producers in underdeveloped countries from learning and renewing their products.

On the other hand, the policy of intellectual property rights increases the expense of the innovations using other creative ideas as an input by pricing them over the previous knowledge, thought and ideas. In fact, the knowledge is historically a matter of accumulation and a whole of actions belonging to the mankind within the process. Therefore, it belongs to the next generations as well as the previous generations (the most striking example of this is the seed production traditionally learned from the previous generations enabling the mankind to survive). Especially in agricultural production, the gathering of this knowledge accumulation about copyright and patent right in the hands of international companies prevents new the creation of innovation. Manipulating over knowledge is against the nature of free trade as well as creating a process against underdeveloped and developing countries (Yıldız, 2009).

Discussions made on intellectual property rights, beginning with 1980's, have been one of the most basic points for debates on international trade. Repressions on underdeveloped countries in terms of improving intellectual property rights intensified with especially TRIPS, which is one of the foundational agreements of World Trade Center. Those countries that hold 97 percent of patents until today in worldwide, compelled underdeveloped countries, which hold 3 percent of patents, bring their own patent systems into conformity with theirs. When TRIPS was signed in 1995, developed countries were already ahead of in fields that was related to intellectual property such as computer software, microelectronics, chemicals, drugs, leisure industry and biotechnology. According to the World Bank datum, after TRIPS, developed countries gain on average 45 billion dollars in a year over underdeveloped countries by means of compulsory license patent payments (Yıldız, 2009).

Increased level of intellectual property rights was drastic and problematic for most underdeveloped countries. There are serious quarrels on intellectual property rights concerning the usage of genetic plant materials and knowledge, particularly in agricultural industry in the so-called countries. Some of the studies point out that improvement of intellectual property rights ensured the rise of expenditure for research and development works in private sector within underdeveloped countries, while other emphasize that it is a different extension of economic exploitation mechanism through which intellectual property rights provides, and imply that there is an important rise in exploitation by this way (Bahadır, Biber, 2014).

Because of its complicated structure, the application of intellectual property rights requires a developed infrastructure. In most developing and underdeveloped countries, this infrastructure is not available. So, it will take long time for effective protection, provided by intellectual property rights, to occur in underdeveloped countries. Because in these countries, it is a very difficult process to transfer the key technologies necessary for private sectors to bring science and technology investments to a sufficient level. So, the issue of intellectual property rights in agriculture creates a much more complicated situation than in other sectors especially for underdeveloped countries. Because, agriculture in these countries has an important position in trade and security (Richer, 1999).

#### ***4. The Impacts of Intellectual Property Rights***

Agriculture has a unique structure requiring a series of technological adaptations in agro-ecological conditions in terms of its variety and unique requirements. Besides, in many underdeveloped countries, poor residents cannot make a living because of harsh agricultural climate conditions and insufficiency of sources. It is very important to enable these countries achieve the agricultural technologies in struggle against poverty. On the other hand, developed countries have the authority in agricultural technologies and maintain it with the help of intellectual property rights. Along with the rapid developments in science, the increases in intellectual property rights caused a unique grow in the private sector investments in agricultural technology in 1990s. After this rapid development in technology investments, there has been an important increase in biotech crops production resistant to diseases and pests in many developed and developing countries in 2000s. As seen from the Table-1.

In 2011, the 16th year of commercialization, the global area of biotech crops continued to climb at a sustained growth rate of 8% or 12 million hectares reaching 160 million hectares or approximately 395 million acres. A similar increase is observed in the global value of the biotech seed market. (Table 1)

**Table-1: Global area of Biotech Crops and the Global Value of the Biotech Crop Market, 1996 to 2011**

Year	Hectares (million)	Acres (million)	Value (Millions of US\$)
1996	1.7	4.3	93
1997	11.0	27.5	591
1998	27.8	69.5	1,560
1999	39.9	98.6	2,354
2000	44.2	109.2	2,429
2001	52.6	130.0	2,928
2002	58.7	145.0	3,470
2003	67.7	167.2	4,046
2004	81.0	200.0	5,090
2005	90.0	222.0	5,714
2006	102.0	252.0	6,670
2007	114.3	282.0	7,773
2008	125.0	308.8	9,045
2009	134.0	335.0	10,607
2010	148.0	365.0	11,780
2011	160.0	395.0	13,251
Total	1,257.0	3,111.0	87,401

Sours: Global Status of Commercialized Biotech/GM Crops: 2011, By Clive James, International Service for the Acquisition of Agri-biotech Applications Briefs 43, 2011

Today in the USA, 60-70 % of the cotton 50-60 % of the soya bean and approximately 50 % of the corn is produced with this developed transgenetic seeds. Increase in the usage of transgenetic materials in agricultural production is valid not only for industrialized countries. The usage of seed developed by international companies is getting more and more common in the agriculture of underdeveloped countries. For example in Brazil, Argentina, Indonesia and India agriculture, the share of genetic seeds provided by international companies is rather high. 40 % of the soya bean, orange juice, chicken and meat products market in Brazil and approximately 95 % of the soya bean production in an area of 14 million hectare are made by using the seeds of Roundup Ready, a genetic engineering product, and its derivatives belonging to such a few international companies as Monsanto and Agroceres. In this process supported by Intellectual Property Rights, a global monopolization in agriculture trade is a matter of fact.

**Table-2: Global Area of Biotech Crops in 2010 and 2011: by Country (Million Hectares\*\*)**

Country	2010	% of World	2011	% of World
USA	66.8	45	69.0	43
Brazil*	25.4	17	30.3	19
Argentina	22.9	16	23.7	15
India	9.4	6	10.6	7
Canada	8.8	6	10.4	7
China	3.5	2	3.9	2
Paraguay	2.6	2	2.8	2
Pakistan	2.4	2	2.6	2
South Africa	2.2	2	2.3	1
Uruguay	1.1	1	1.3	1
Bolivia	0.9	1	0.9	1
Australia	0.7	<1	0.7	<1
Philippines	0.5	<1	0.6	<1
Myanmar	0.3	<1	0.3	<1
Burkina Faso	0.3	<1	0.3	<1
Mexico	0.1	<1	0.2	<1
Spain	0.1	<1	0.1	<1
Colombia	0.1	<1	0.1	<1
Chile	0.1	<1	0.1	<1
Honduras	0.1	<1	0.1	<1

Sours: Global Status of Commercialized Biotech/GM Crops: 2011, By Clive James, International Service for the Acquisition of Agri-biotech Applications Briefs 43, 2011

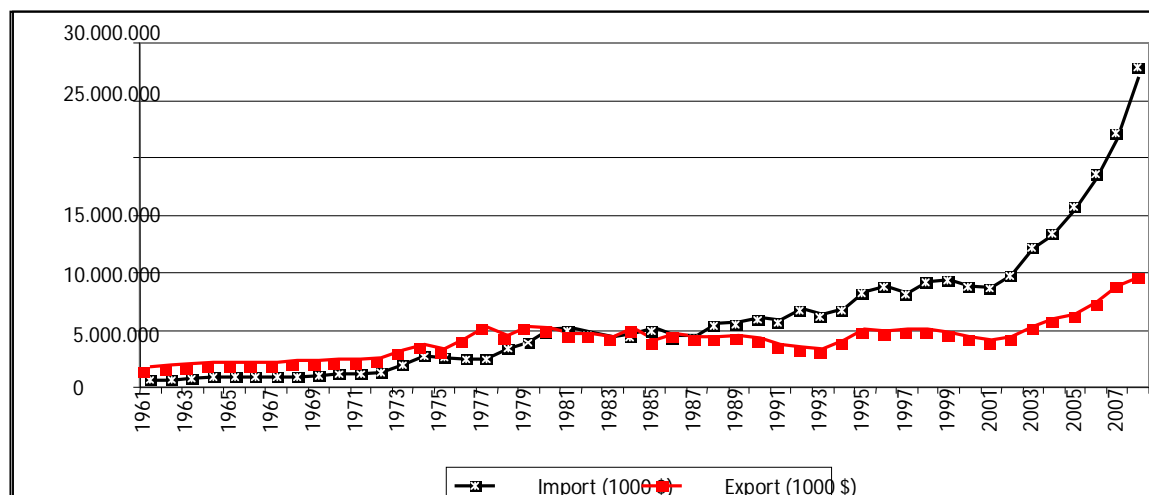
When we look at the Biotech Crops production in Table-2 on a country basis, it is realized that IPR and technological development supported by itself lead an important growth in Biotech Crops production. However, when we look at the productions and trades of developing and underdeveloped countries in detail, the case is different. If we examine a few examples in Table-2, the first characteristic in such countries as India, Burkina-Faso and Pakistan, the countries among the first 20 in Biotech Crops production, is that the access level to staple food production and food is really low. Firstly, for example in the last twenty years of Pakistan, there is no change in the net importer view in total agriculture and food products. (FAOSTAT,2014). Besides, there are important national and international investments for Biotech crops in Pakistan. Planting area of such important biotech products as corn and cotton has recently been increased over 1 million hectare (Clive, 2011). Although the most important ones are cotton, maize and sugarcane among Biotech crops products, according to FAO data, Pakistan was gradually turned into a net importer position after 1996 in cotton and drawn-out sugar while it was in an exporter position till 1996. It is also realized that it was a net exporter in corn produced by such international companies as Pioneer and Monsanto. Moreover; it is in rather back positions in such important indications of food security as the access to food, foreign source dependency in cereal products and price indexes within the country (FAOSTAT, 2014).

In India, having a vast agricultural are, agriculture sector makes up 17 % of GDP. When we look at the statistical data, 35 % of India export is composed of cotton, corn, soya bean and greasy seeds although the country is in an exporter position in total agricultural products recently having made progress in agricultural production. Cotton, an important trade product for India in recent years, is called as Bt Cotton, a genetic type, and produced by Monsanto. It does not have any exporting dominance in food products trade and it is seen that its position changes to “the net exporter” in recent years. It is also seen that such indications as “the access to sufficient food” go wrong. In such developing countries as Brazil and Argentina, in a good position in terms of agricultural export data, approximately 60 % of total agriculture export is composed of soya bean, raw sugar, chicken meat and fruit juice in the inspection of international companies (FAOSTAT, 2014). To evaluate as a whole, it is hard to say that specializing in Biotech Crops production supported by intellectual property rights provides a big advantage to the developing and underdeveloped countries in international trade. On the other hand, there is a change into a foreign dependency structure in such basic fields as staple food production, food security and agricultural foreign trade.

Generally when we look at underdeveloped countries, unequal development process, which TRIPS provides for the benefit of developed countries, has directly affected the production structures, production relations and agricultural foreign trades of these countries, that is their agricultural structures as a whole. This negative change caused an increase in the foreign dependency level of especially the underdeveloped countries in their staple food products. On the other hand, this process caused an increase in the prices of basic agricultural products as well as being allocated for bio-fuel product in the increasing level of energy requirement and agricultural fields. According to some predictions, cereals in the ratio of % 5 is turned into bio-fuel every year. If we think that total cereal production worldwide is around 6,5 billion tonnes in 2013, 325 million of this is separated for bio-fuel production (FAOSTAT,2014). Besides; corn, wheat, soya bean and other products in an area of 8 million hectares have been used for animal feed and bio-fuel production only in the USA since 2006. In 2008, 18 % of cereal production has been used for bio-fuel production. Moreover; Brazil is the second biggest ethanol producer and exporter in the world. Large amounts of corn and soya sugarcane are used for bio-fuel production in Brazil. Because of its high trade income, many farmers in Brazil have recently been separating the majority of their products for bio-fuel production. And so, it increases the prices of many staple food products, especially the cereal products. (Singh, 2009).

Uptrend in the prices of such staple food products as wheat and grain products, meat products, milk and milk products, cooking oil and sugar caused many underdeveloped food importer countries to pay high bills as well as an important decrease in the food security in these countries and the emergence of or increase in chronic hunger in many regions. It is possible that these effects will continue in the following years and serious food crisis and fighting will be faced. It is inevitable that the most affected country groups will be the underdeveloped net food importer countries. It is seen in Graphic-1 that underdeveloped countries have come into the position of net agricultural product importers from agricultural product exporters since the beginning of 1990s in agricultural product trade. The most important reason of this process, as mentioned before as well, is the structural cohesion policies in the world trade occurring rapidly in 1990s. It is seen in the graphic that the dependency of underdeveloped countries on agricultural product import has gradually been continuing after this period.

**Graphic-1: Agricultural Foreign Trade in Underdeveloped Countries (1000 \$)**



**Source:** FAOSTAT

**Note:** The change in the balance of agricultural foreign trade includes 49 underdeveloped countries.

When we look at the price index for basic agricultural products in Table-3, it is seen that the increase in agricultural product prices is heavily on grains, cereal products, meat products, oils and milk products imported by underdeveloped countries. So, underdeveloped countries have disadvantages in foreign trade because they cannot give a sufficient support to their own agriculture producer and they have to pay high export bills because they are net exporters of the so called products. Relative low prices for the products such as tropical fresh fruits and vegetables with low value added cause an unequal increase in the export incomes although their export amounts increase. In other words, underdeveloped countries have to export more products in order to be able to increase their export income because of low prices.

**Table-3: Food Price Index 1990-2010 (2002-2004=100)**

Years	Food Price Index	Meat products Price Index	Dairy Price Index	Cereal Price Index	Oil Product Price Index	Sugar Price Index
1990	107,9	131,3	74,8	97,6	74,0	178,1
1991	103,5	125,3	79,6	96,9	79,1	127,2
1992	106,7	120,3	95,4	102,3	84,3	128,5
1993	105,4	120,4	84,6	99,5	86,0	142,2
1994	111,7	118,5	82,3	104,5	113,4	171,8
1995	121,9	114,7	109,6	119,4	125,0	188,5
1996	124,1	114,1	109,4	140,7	111,2	169,7
1997	113,5	109,2	105,1	112,1	112,5	161,4
1998	103,7	93,5	99,1	99,8	129,9	126,6
1999	91,1	94,4	86,3	90,2	91,6	89,0
2000	89,5	93,9	95,4	84,5	67,8	116,1
2001	92,3	93,7	107,1	86,2	67,6	122,6
2002	90,2	90,3	82,2	94,6	87,0	97,8
2003	98,3	98,7	95,1	98,1	100,8	100,6
2004	111,5	111,0	122,6	107,4	112,2	101,7
2005	114,7	112,7	135,4	103,4	103,6	140,3
2006	122,4	106,7	128,0	121,5	112,0	209,6
2007	154,1	112,1	212,4	166,8	169,1	143,0
2008	190,9	128,3	219,6	237,9	225,4	181,6
2009	151,5	117,7	141,6	173,7	150,0	257,3
2010	170,0	133,0	198,5	167,8	176,4	277,9

**Source:** FAOSTAT

As it is seen; positive aspects of this new protectionism, provided by intellectual property rights, such as supporting innovation in production are highlighted while its negative aspects are ignored. Protection of intellectual property rights by TRIPS is a controversial issue especially in terms of two aspects. The first of these is the fact that the agreement proposes a very long protection period of 20 years for the patent and other intellectual property rights. While this long period of protection provided by the agreement over rewards the property right holders, it also functions for the benefit of public welfare in the same degree. Secondly, long time over protection may slow down the spreading of new technologies and make it difficult for underdeveloped countries to obtain the products because of their high prices. Intellectual property rights in agriculture is an important example of this (Richer, 1999).

Studies of UNEP lay stress on two negative impacts of intellectual property rights for agriculture. The first one is that growing investments help industry to be reshaped on a larger scale. It is impossible to allure products, which need big investment, into market without protecting intellectual property rights though. On the other hand, it is clear that only big firms can survive in this market that needs major investment, and today the domination of big companies over the market, in particular in seed sector, is a sign for this. In order to strengthen their positions in market, international firms increasingly buy small-scale firms. Thereby, since there would be less price competition among rest of the firms, it is possible that there would be an increase in the price of products such as seed which rely on intellectual property rights (Bahadır, Biber, 2014). The second negative effect is that, instead of conventional products, farmers incline to high productive seeds which is improved by international firms. Whereupon this leads to a decrease in genetics diversities of cultivated species. An indication of this is that, with encouragement for the usage of seed diversities, which are known as more durable and more productive against pests and diseases, farmers are gradually removed from conventional seeds along with the "Green Revolution." Not only incentives that were supplied for international seed firms to improve new diversities, but also intellectual property rights were significant factors for the decrease in diversities (Bahadır, Biber, 2014).

Thus, it is not wrong to say that intellectual property rights and protection caused three major effects, and these effects, by the same token, are a sign of violation of human rights. Firstly, intellectual property rights give rise to monopolization by restricting access to information.

Secondly, it allows international agriculture corporations for the modification of genetics belonging to seed diversity. While it increases profits of international corporations, which they gained from technological innovations, it restricts seed diversity and access to seed as well. Thirdly, by encouraging farmers for product cultivation, which is a commercial value, instead of subsistence farming, intellectual property rights system supports commercialization of agriculture and monoculturalization in farming. Besides opportunities and preservations intellectual property rights provide for big international corporations, the restrictive impact of it on public interest have subversive effects on human rights in accordance with access to food and conventional protection of information. Another important question is environmental impacts that new division of labour created in underdeveloped countries (Bahadır, Biber, 2014).

## 5. Conclusion

Although improvements in agricultural productivity were closely linked to investments in agricultural research and development, the creation of monopolies on knowledge in agricultural production by IPRs, is against the nature of free trade as well as creating a process against underdeveloped and developing countries. Another important point that increased protectionism by intellectual property rights, is a different extension of economic exploitation mechanism. Because uptrend in the prices of primary food products caused many underdeveloped food importer countries to pay high bills as well as an important decrease in the food security. So, underdeveloped countries have disadvantages in foreign trade in this process. Meanwhile it is hard to say that specializing in Biotech Crops production supported by intellectual property rights provides a big advantage to the developing and underdeveloped countries in international trade. On the other hand, there is a change into a foreign dependency structure in such basic fields as staple food production, food security and agricultural foreign trade.

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