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Intellectual Property Protection for Crop Genetic Resources

A Suitable System for India

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CHAPTER 1: INTRODUCTION

A primary aim of Indian agricultural policy is food security.[1] To keep pace with the annual growth rate of population, which amounted to an average of 2.1% annually in the last decade,[2] India has to increase its agricultural production steadily. Since a high percentage of the country's geographical area is already under cultivation and possibilities of area expansion are minimal, increases in agricultural production must result from improvement of agricultural productivity per unit of land.[3] A crucial input for attaining sustained growth of agricultural production is seed. According to some estimations more than half of the real productivity growth in developing country agricultures can be attributed to crop improvement.[4]

In the international and Indian discussion on how to achieve growth of agricultural production, sustainable development, and increase of income for small and marginal farmers, three types of crop genetic resources are cited which could potentially play a crucial role in reaching these goals in the future:

(1) modern high yielding varieties (HYV), a variety being defined as population of plants which are largely the same in their characteristics (resulting from a given genotype or combination of genotypes) and remain the same within specific tolerances after every propagation.[5]
(2) genetically modified plants, i.e. plants modified in their genetic structure by using recombinant DNA technology, and
(3) farmers' varieties or landraces, which can be defined as "heterogeneous crop populations that humans deliberately cultivate [and] that are not products of modern plant breeding or subject to purifying selection."[6]

Behind these three types of crop germplasm[7] stand different types of breeding activities in the largest sense of the term with very different technical and economical characteristics and carried out by different stakeholders[8]: HYV are developed by a specialized breeding industry, whose work is principally based on selection and crossing steps but which now uses highly technical and sophisticated tools to control the genetic structure of the resulting populations. Landraces are not, as suggested by early authors in the first half of the last century, the result of natural adaptation to the

[1] See GOVERNMENT OF INDIA, Planning Commission, 9th FIVE YEAR PLAN (1997-2002), at para. 4.1.20. See further GOVERNMENT OF INDIA, Planning Commission, 10th FIVE YEAR PLAN (2002-2007), at para. 5.1.2.
[2] See GOVERNMENT OF INDIA (2003), table 2.3: "Population, Growth Rate – 2001 (Provisional)".
[3] See SIDHU/SIDHU (1994), at 77; GOVERNMENT OF INDIA (1997-2002), at para. 4.1.67.
[4] See EVENSON (2002), at 7.
[5] A similar definition is used, e.g., by the Enlarged Board of Appeal of the EPOin its decision G 1/98, at point 3.1 of the reasons. For more details on the plant variety definition, see below chapter 3, A.II.1, at 81.
[6] See BROWN (2000), at 29.
[7] The term "crop germplasm" can be defined as an array of plant materials, such as landraces, improved varieties or wild relatives, that serves as a basis for crop improvement.
[8] Stakeholders are understood in this paper as persons or entities with a stake in a particular issue or resource, e.g. in the IP context producers and users of knowledge.

local environment,[9] but the result of a dynamic interaction between farmers and their crops.[10] For this reason, in the following, the term "farmers' varieties" will be preferred. Finally, genetically modified plants are developed by genetic engineers. The result of their scientific work is a modified plant, not a marketable plant variety.

The development and/or conservation of the above three components of crop genetic resources will, among other things,[11] depend on economic incentives to pursue these activities. Yet, improvers of crop germplasm face a significant problem when they attempt to appropriate part of the added value of their improved crops.[12] Since plants are capable of self-reproduction and transfer improved characteristics from one generation to the next there is generally no need for the users of the plant innovation to have recourse to the developer for supply. At the same time, the economic return from the sale of the first generation of plant material may not provide sufficient incentive for the private seed developer to invest time and resources in crop improvement. The idea of intellectual property rights (IPRs)[13] in crop germplasm is to grant germplasm improvers an exclusive right of exploitation in order to secure a reasonable return on their investments.[14] This is one of the "classical" arguments that have lead to the introduction of plant breeders' rights (PBRs) for plant varieties and patents for genetically modified crops. The same line of thinking is now also increasingly applied to farmers' varieties.[15]

For this reason, with respect to all three types of crop germplasm, the introduction of IPRs is discussed as possible part of the solution to ensure increased and yet sustainable agricultural production. Exclusive rights for breeders of modern varieties,

[9] See the references given by HALEWOOD *et al.* (DISCUSSION PAPER of 2003), at 4.
[10] This interaction will be described in detail in chapter 7.
[11] Another important element is legislation on seed quality and registration which may, by imposing registration and/or high purity standards on all commercialized seeds, seriously affect the dissemination of farmers' varieties and more generally seed supply by farmers. Although this issue is closely linked to the development and/or conservation of the above three components of crop genetic resources it will not be discussed in detail in this book. The Seed Bill 2004 introduced in the Rajya Sabha on 9 December 2004 is rather unclear, highly controversial and would, if interpreted in a certain way, contradict the spirit of the Protection of Plant Varieties and Farmers' Rights Act. The Bill is available at http://agricoop.nic.in/seeds/seeds_bill.htm. A few aspects of this Bill will be mentioned below in chapter 8. However, a detailed analysis of this piece of legislation which, if passed by Parliament, could have a tremendous impact on the seed sector, would go beyond the scope of this book.
[12] This problem will be discussed in detail in chapter 4.
[13] Intellectual property rights can be defined as rights and interests in intangible assets susceptible of being used in commerce.
[14] On the 'Need for Legal Protection of Plant Varieties' see UPOV, The UPOV System of Plant Variety Protection, at 4 of 13, available at http://www.upov.org/en/about/upov_system.htm, last visited on 10.03.03.
[15] According to the Commission on Plant Genetic Resources (CPGR), "the major factor driving genetic erosion is that traditional farmers, their communities and countries, who develop and conserve agro-biodiversity, are generating externalities as providers of a 'public good', that is, they are producing global values for which they obtain no return, and are therefore without incentive to continue them: without appropriate and urgent solutions to this paradox, the loss of agro-biodiversity will accelerate, with irreversible, serious global consequences." See FAO Doc. CPGR-Ex1/94/Inf. 1 (Sept. 1994), at 21, para. 34, as quoted by GIRSBERGER (1999), at 68.

for farmers conserving and improving landraces, and for plant genetic engineers could provide an incentive for increased research and development (R&D) and local conservation and breeding efforts.

On the other hand, critics point out that granting exclusive rights implies imposing restrictions on the use of the relevant germplasm. This necessarily leads to welfare losses which have to be balanced against the benefits of intellectual property (IP) protection. These welfare losses have particular weight in technology imitating countries where the positive dynamic effects of IP on R&D can be partly replaced by technology spillovers from industrialized countries by imitation. Opponents to IP protection in developing countries emphasize that exclusive rights could allow multinational corporations (MNCs) to dominate the seed market and hamper the rising domestic industry which is scaling up its R&D skills by adapting foreign technology. They further fear that these rights could hinder the diffusion of new technology and endanger the existence of small farmers depending on farmer-to-farmer seed sales.

Whereas in Europe the shape of plant related IP legislation is mainly debated in the specialized literature, in India the implementation of Art. 27 of the TRIPS Agreement has been accompanied by a heated public debate. Protest rallies have repeatedly mobilised hundreds of thousands of farmers. In order to understand the passionate controversy about seed related IPR one has to keep in mind the important role agriculture plays in the Indian economy and the crucial role that seed plays in the life of Indian farmers. The agriculture sector has still a vital place in the economic development of India. Although the share of agriculture, including allied sectors of forestry & logging and fishing, in the GDP has declined from 39% in 1983 to 25% in 1999-2000,[16] compared with industrialized country economies this share is still significant. Similarly, yet at a slower rate, the share of agriculture in total employment declined from 63% to 59%.[17] On an individual level, for many Indians the availability of seed and its performance is still a question of survival. India has overcome its import dependency in the last decades and can now claim to be self-sufficient. Nevertheless, this success of agricultural policy is still very fragile in view of population growth and natural resource degradation.[18] Therefore any new policy in the agricultural sector raises concerns about its implications for food security. Any legislation that impacts agricultural development has to be particularly carefully designed.

Experts and commentators in India further criticize that the industrialized country models of plant related IP protection only protect crop improvement activities that take place in the formal sector, i.e. that of specialized plant breeders and of plant genetic engineers.[19] They do not recognize and reward the contributions to modern plant

[16] See GOVERNMENT OF INDIA (2004), at 20.
[17] See id., at 124. The total economically active population is estminated at 451 million, 267 million in agriculture.
[18] See below chapter 5, C.I und III.1.
[19] Formal sector research/crop improvement/breeding is understood here as research that takes place in public academic or other scientific institutions, as well as in corporate research laboratories, greenhouses, test fields, and is carried out by specialized researchers. It is embedded in a scientific

breeding of actors in the informal sector, i.e. of farmers who enhance and conserve crop genetic diversity. There is indeed a permanent exchange of germplasm between the three groups of stakeholders involved in the crop improvement activities described above. Formal sector breeders depend for their work on the availability of genetic diversity, which will stem either from other HYVs, from farmers' varieties or from genetically modified plants. Farmers, seen as one group,[20] are providers of genetic diversity and users of modern crop technology. Finally, genetic engineers use *inter alia* genetic components of farmers' varieties and depend on breeders for reaching the end-users of their invention, since the outcome of a biotechnological process is not yet a stable heterogeneous high-yielding plant population. All three groups of stakeholders are at some point users of germplasm improved by another group and at another point providers. "Classical" IP systems in industrial countries subject the use of new seed technology developed by the formal sector to certain restrictions, while the use of heterogeneous populations developed by farmers is free, as they do not meet the requirements of PBRs protection. This has led critics to speak of "one way subsidy".[21] But a careful differentiation between different shapes of IPR systems is necessary. Certain systems permit only a very limited scope for appropriation by formal sector breeders and leave the remaining benefits to farmers. It is indispensable to take a comprehensive approach and discuss costs and benefits for all three groups of different IP protection solutions for HYV, genetically modified crops, and farmers' varieties in order to find a balance between the different interests involved.

The following paper develops suggestions as to what shape a comprehensive system of crop related IP protection for India should take. In order to arrive at these suggestions, the following structure is adopted: Chapter 2 will highlight the international commitments, which may reduce the scope of action of the Indian legislature in the area of plant genetic resources. These obligations stem from the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement)[22] which obliges Member States to provide certain minimum standards of protection, from the Convention on Biological Diversity (CBD)[23], and from the International Treaty on Plant Genetic Resources for Food and Agriculture (PGFRA Treaty).[24] Chapter 3 will give an overview of the European system of plant related IP with its two alternative protection regimes, one for plant varieties, the other for plant related inventions. This

knowledge system which assumes that researchers have the potential to understand the processes of nature, to describe underlying causalities in theory and to harness theory to manipulate the environment. VAN DUSSELDORP/BOX (1993), at 22, term this the "voluntaristic worldview". In contrast, informal sector research takes place outside this organized environment and is not necessarily based on this voluntaristic wordview.

[20] Yet, the individual farmer who conserves traditional germplasm may not be the same as the farmer who uses modern seed technology.

[21] See SWAMINATHAN (1995b), at 247.

[22] Agreement on Trade Related Aspects of Intellectual Property Rights of 15 April 1994, available at http://www.wto.org/english/docs_e/legal_e/27-trips.doc, in force since 1 Januar 1995.

[23] Convention on Biological Diversity of 5 June 1992, available at http://www.biodiv.org/convention/articles.asp, in force since 29 December 1993.

[24] International Treaty on Plant Genetic Resources for Food and Agriculture, approved through FAO Resolution 3/2001 of November 2001, available at http://www.fao.org/legal/TREATIES/033t-e.htm, in force since 29 June 2004.

chapter will thus permit analysing a system in operation which combines patent protection restricted to specific areas of plant related innovation with a protection system specifically adapted to plant varieties. In order to draw lessons from this experience for the Indian legislature, views of experts and stakeholders on the system will be presented. Chapter 4 will discuss the principal findings of the literature on economics with respect to the economic impacts of IP protection in order to provide the necessary background for later analysing the arguments set forward in the debate in India. Since the optimal design of IP legislation depends on the economic situation in a specific sector in a given country, chapter 5 will highlight the present status of the Indian seed sector and the future challenges that agricultural policy will have to respond to in this sector. The Indian debate on the potential impact of PBRs and patents on the seed sector in India will be analysed in chapter 6. Chapter 7 will review the possibilities and implications of protecting farmers' varieties by a *sui generis* IP system. Chapter 8 will outline the Indian legislation relating to IP protection for plant genetic resources. Finally, chapter 9 will submit suggestions for the main features of a suitable system of IP protection for plant genetic resources in India.

Before discussing the legal and economic dimensions of the present issue, it should be mentioned that the arguments set forward against PBRs and patents in the agricultural sector go beyond the questions of economic and social impact which are in the focus here. There is, for instance, a school of thought that believes that all knowledge related to agriculture and seed should be part of the public domain or be owned collectively by all Indians or all farming communities, because turning seeds and related knowledge into a commodity is contrary to the beliefs of the farming communities concerned.[25] Some examples of traditional customs and beliefs may illustrate this view:

> "New seeds are first worshipped and then planted. The new crop is worshipped before being consumed. Both these festivals – planting and harvest – are celebrated in the fields and symbolize people's intimacy with nature. At the time of planting, the field is seen as mother; worshipping the field is a sign of gratitude towards the earth, who as mother feeds the millions of life forms who are her children. Festivals like *Ugadi*, *Ramanavami*, *Akshay Trateeya*, *Ekadashi Aluyana Amavase*, *Naga Panchami*, *Noolu Hunime*, *Ganesh Chaturthi*, *Rishi Panchami*, *Navratri*, *Deepavali, Rathasaptami*, *Tulsi Vivaha Campasruti* and *Bhoomi Puja* cannot be celebrated without religious ceremonies around the seed. […] According to Hindu mythology, seed is a gift of Srushtikarta (Brahma, the creator), who created seeds in primordial times. […] Seed is also considered and worshipped as Dhanalakshmi (the goddess of wealth)." [26]

This raises the questions how widely these practices are spread and to what extent these beliefs are perceived as contrary to any form of IP. These issues and related ethical considerations are beyond the scope of this paper. It is only obvious that within India itself different cultures are clashing. The heterogeneity of beliefs that exists

[25] See SHIVA (2001), at 69 *et seq.*
[26] See SHIVA (2001), at 70/71.

within India in this respect is certainly an immense challenge to the Indian legislator and may have influenced the assessment of political feasibility of certain solutions.