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Intellectual Property Rights and Agricultural Plant Genetic Resource

Benjavan Rerkasem*

The world has benefited enormously from the modern innovation of high yielding crop varieties (HYV's) that were the hallmark of the Green Revolution. Central to the realization of this benefit was the free exchange of plant genetic resources and the unrestricted movement of genetic material. Local varieties, farmers' varieties, landraces[1] and wild relatives from various countries were sent to the world's genebanks and international crop breeding programs, e.g., those at the International Rice Research Institute (IRRI), International Centre for Maize and Wheat Improvement (CIMMYT), Asian Vegetable Research and Development Center (AVRDC). In return, improved varieties and lines were provided to national breeding programs, where they were either released to farmers after appropriate testing or had some of their selected genetic traits incorporated into locally adapted varieties. This highly effective yet simple and open arrangement, however, can no longer be taken for granted.

The change has been brought about by a world-wide trend that has witnessed the extension in scope of intellectual property rights (IPR) to cover plant genetic resources. The threat comes from the inequitable application of IPR legislation, in which protection is extended to some varieties, mostly those bred and claimed by seed companies and institutions, but leaving all others, including traditional, locally developed varieties, landraces and raw germplasm, as public property available to all.

THE BASMATI PATENT

The danger of asymmetry in the application of IPR was brought home to many, especially in the developing world, by the granting of a US patent entitled "Basmati rice lines and grains" (US005663484A) to RiceTec Inc., a US seed company based at Alvin, Texas, on September 2, 1997 (Box 1).

The name Basmati applies to a group of high quality, aromatic traditional varieties of rice from certain areas of Asia. Asia's high
quality rice varieties, which also include Thailand's Thai Fragrant jasmine rice, while not so high yielding as the modern semi-dwarf type, occupy the higher end of the world rice market and are priced up to twice as much as ordinary rice. Basmati has long been an important export earner for Pakistan and to a lesser extent India; Thailand's rice exports are dominated by Thai Fragrant jasmine. Valued traits of these are embodied in the genetic make-up of the traditional varieties that have long been considered open resources.

By granting the Basmati patent to RiceTec, the US Patent Office had essentially deprived Pakistan, India or anyone else of their prior use-rights to all the genetic trait and genes that give rise to the essential characteristics of Basmati and other similar aromatic fine grain rice, and so denied them the right to sell such grain, in North, Central or South America, or Caribbean Islands.

CLAIM STAKING A COMMON GENETIC RESOURCE—THE BASMATI LESSON

A very major proportion of the world's valuable agricultural germplasm now lies in the public, common access, pool of plant genetic resource. Pakistan's Basmati rice varieties and Thailand's premier Thai Fragrant jasmine, KDML 105, are all freely available to anyone from IRRI or many of the numerous rice improvement programs in various countries where rice is grown. Valued traditional varieties as well as raw germplasm, landraces and wildtypes of all of the plants with any economic value have now been acquired, not only by the international public research centers such as CIMMYT, IRRI and AVRDC, but also by private as well as public genebanks and crop breeding programs all over the world.

The wealth of genetic information in this openly accessible genepool includes all aspects of crop characteristics, from

their
adaptation, e.g., to harsh environments and poor soils, reaction to diseases, pests and weeds, to various aspects of grain or product quality (nutritive, special taste and market characteristics). Very few of these traits that have been propagated and conserved over generations by farmers are likely to have been described and published in detail, at least not in such a way that would be interpreted by most patent laws as "prior disclosure," and so they are exempted from IPR claims in most countries.

The Indian government is challenging the Basmati patent in a Texas court, on the ground that the claims lack novelty. A campaign has also been organized by the Rural Advancement Foundation International, a Canadian NGO aiming to shame RiceTec into giving up the patent. Whatever the outcome of these legal and political actions, the Basmati patent has taught two valuable lessons on the management of the world's agricultural plant genetic resource.

Firstly, it has highlighted the danger of the traditional users' age-old rights to use valuable germ-plasm from the public genepool
being appropriated by monopolistic ownership under the guise of IPR.[3]

Secondly, it has invalidated two important assumptions frequently used to defend the current IPR system, that (a) it costs countries nothing to provide germplasm for the breeding of new proprietary varieties that will later be patented,[4] and (b) only raw germplasm with little value is used in the breeding of the proprietary elite varieties.[5]

For obvious political reasons, many have characterized this equity issue in problems with IPR as a North Vs. South or developed countries Vs. developing countries issue. In fact, future IPR troubles over plant genetic resource may very well be between the developing countries themselves. Competition is likely to become increasingly fierce among countries in the same region which share many of the same crops and are competing in the same markets. For example, the Yuan Longping Hybrid Rice International Co., Ltd. has recently been established in China as a joint venture between Hunan Hybrid Rice Research Center (a government owned research organization of the Hunan province), Seed & Crops Digest, RiceTec and CBG Hybrid Rice, LLC.[6] With their use of the same strategy that RiceTec employed with Basmati in the US, Thailand can expect not only to be legally locked out of its most important fragrant rice market, China, but also to forfeit the use-rights to a set of very valuable rice genes.

According to some in Thailand, a "patent" application (supposedly called Jasmati rice patent) has actually been placed under
consideration by the US Patent Office. But the problem in Thailand is that public debates on this issue are very poorly informed, and are full of misconceptions and very few hard facts. For example, it took a long time before published accounts began to refer to Jasmati as a trademark and not a patent along the same line as the Basmati Patent. This points to yet another problem: the woefully inadequate legal and technical capacity at the national level in most developing countries (perhaps excepting India) to deal effectively with the issue of IPR.

A NEW AND VERY DIFFERENT TRAGEDY OF THE COMMONS

Given that new and improved crop varieties are developed from common genetic resources, developing countries have been calling for free access to those commercially developed crop varieties.[7] Developed countries have rejected this claim on the grounds that IPR for commercial varieties is a necessary incentive to encourage private sector research. This counter argument has, however, failed to address the main issue of the loss of age-old use-rights to genetic resources, as valuable genetic traits and their embodying genes derived from the common pool are incorporated into proprietary varieties.

In order to protect their own age-old use-rights countries may contest patents in court, as India has successfully done with a US patent related to turmeric,[8] and is now doing with the Basmati patent. But their ability to keep up with future demands for crop genetic improvement, and hence sustainable crop production, would be seriously undermined if countries have to keep going to court to protect use-rights to their own plant genetic resource. Furthermore, very few countries have India's legal and technical clout,[9] and very few countries indeed can afford the financial expense of court actions in the USA or Europe. In any event, there is no reason why countries, especially poor ones, should have to squander their scarce resources trying to reclaim something that was theirs in the first place. It seems that the management of one of the world's most valuable and irreplaceable resource is inequitable as well as inefficient.

There is a real danger that yet another "tragedy of the commons" may now be in the making, but one which is much more

catastrophic than any seen to date. Tragedies of the commons happen because the insufficient protection of property rights
encourages overexploitation, eventually causing the degradation of the resource in question.[10] In the original "commons" of 17th century England, degradation of common land was prevented or reversed by the enactment of land ownership laws which empowered landowners to enclose the land with fences and provided incentive for conservation and improvement. The current IPR system, however, seems to be undermining instead of enhancing the effective management and conservation of common agricultural plant genetic resources.

Countries are now becoming increasingly reluctant to contribute to the maintenance of public international genebanks and breeding programs. Those who contribute germplasm fear they will lose not only access and control, but also their age-old use-rights. Those who contribute funds to the upkeep of international facilities are now questioning the return on their investment. This conflict is placing in jeopardy two valuable public services provided by the genebanks and breeding programs associated with the International Agricultural Research Centres (IARC's), (a) a most cost effective and technically reliable *ex situ* conservation of germplasm in the developing world, and (b) the transfer of an enormous range of genetic materials of all the important crops to various countries and regions each year (e.g., see Box 2 for example from CIMMYT, similar flows go out from all of the public breeding programs associated with the IARC's) which contributes toward the maintenance of *in situ* genetic diversity of the major crop species.

The Convention on Biological Diversity (CBD), one of the latest multilateral attempts to address problems associated with the
exchange and use of plant genetic resources, appears to have a very limited capacity to deal with this problem. The CBD asserts (Article 15) that countries have sovereign rights to their indigenous genetic resources. The CBD, however, covers only ownership and status (and provision controlling access and benefits sharing) of those resources acquired after the convention had come into effect, i.e., after 1992. Some developed-country governments have come out firmly against making sovereign rights over plant genetic resources covered by the CBD retroactive.e.g.[11] Therefore, the CBD is unlikely to be of much help for the management of a very large portion of the common agricultural plant genetic resources, which had already been acquired by genebanks and breeding programs around the world long before 1992. Furthermore, perhaps even more importantly, the protection and conservation of valuable germplasm in a country's jurisdiction covered by the CBD is by no means guaranteed by national ratification of the convention. Genebanks are expensive to maintain, they are also technically exacting. An international survey has found that seed samples kept in many facilities have lost either their genetic diversity and/or viability, leading to the suggestion that these should be more appropriately called "gene morgues" rather than genebanks.[12] *In situ* conservation, on the other hand, has had limited success; traditional varieties continue to disappear from farmers' fields through out the world.

Many achievements in plant breeding, with or without contributions from biotechnology, can be truly innovative. New innovations in plant breeding, and therefore progress in crop genetic improvements, may indeed be encouraged by rewarding those who have invested resources to bring them about. There is, however, a fundamental flaw in the current IPR system as it has been applied to plant genetic resource in many countries, in allowing "inventors," by means of patents which are extremely inclusive in their claims, to appropriate monopolistic IPR over many genetic traits and genes that have not been a part of their own invention at all but have simply been acquired from the public genepool, thereby depriving others of their age-old use-rights to those genetic resources. This has created an atmosphere of mistrust between providers and users of agricultural plant genetic resources, to an extent that the management of a common but irreplaceable resource is being placed at grave risk.

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