DESIDOC Bulletin of Information Technology, Vol. 27, No. 6, November 2007, pp. 3-11
© 2007, DESIDOC

Mechanisms for Protection of Agricultural Innovations in India

R. Kalpana Sastry

National Academy of Agricultural Research Management
Rajendranagar, Hyderabad-560 030
E-mail:kalpana@naarm.ernet.in

ABSTRACT

The paper discusses various conventions/treaties/agreements affecting agriculture innovation systems, and the legal mechanisms existing in India for such innovations. It raises concerns on how the policy environment and governance is affecting the agriculture at large, and agri-based products in particular. It also discusses the role of various agencies including public, private and NGOs in India in protecting vast biodiversity and the measures they need to take to meet the challenges related to issue of IP protection related to agriculture in the country.

Keywords: Agriculture innovation, CBD, CITES, IPPC, TRIPS, UPOV, ITPGRFA

1. INTRODUCTION

Distinct paradigm shifts in agricultural systems are progressively reorienting mechanisms and mode of agricultural research and innovation systems all over the world including India. Encouraging results and broad commercial prospects are catalysing forces[1] for new players including private sector to be part of this. However, the entry of new players and opening of markets in global arena has also brought new equations on owning of intellectual property (IP) and resultant difficulties in accessing inputs for research. The role of intellectual property rights (IPRs) in international trade, the global economy and international relation has grown considerably, especially since 1970s[2]. IPR-protected products, technologies and services are major exports and rights manifesting in form of licenses to use the patented processes, products, designs, trademarks or copyrights. All these developments necessitated legal protection mechanisms to be in place[3].

Over the last few decades, several agreements at various international fora have been negotiated and adopted in order to enhance and better the livelihood, and to help the nations achieve the targets set in the millennium development goals. Some of these are of direct relevance to sustainable agriculture, enhanced trade and ensuring better environment. The agreements include Convention of Biological Diversity (CBD), 1992; Convention on Trade in Endangered Species (CITES), 1973; International Plant Protection Convention (IPPC), 1997; International Union for the Protection of Plant Varieties (UPOV), 1978 and 1991; Cartagena Protocol on Biosafety, 2000; Trade

Related Intellectual Property Rights (TRIPS), 1994; and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), 2001. These international conventions/treaties/agreements have comprehensive provisions for conservation and sustainable use of, and access to genetic resources and for sharing of benefits derived from their use[4]. Concurrently, new emerging regimes in protection mechanisms for innovations at the global levels are impacting the access, transfer, and use of biological/genetical resources for furthering the research and developmental activities in all fields of agriculture (Table 1).

All these agreements have thus led several national governments, including India, to put in place the commensurate and compliant mechanisms and instruments. Some of the legal instruments passed by the Indian Parliament as part of compliance to the TRIPS include: The Patents Act, 1970 (No. 39 of 1970); The Patents (Amendment) Act, 1999 (No. 17 of 1999); Patents (Amendment) Act, 2002 (No. 38 of 2002); The Patents (Amendment) Act, 2005 (No. 15 of 2005); The Geographical Indications of Goods (Registration and Protection) Act, 1999; and The Protection of Plant Varieties and Farmers Rights Act, 2001 [PPV and FR Act) (No. 53 of 2001)]. Apart from these, the Government of India also enacted an umbrella legislation called the Biological Diversity Act, 2002 (No.18 of 2003). Consequently, the operational mechanisms and setting up of the regulatory bodies is now in process. That the mechanisms are in place indicate towards creating an enabling environment of actualising and ensuring complementation for positive synergies towards building strong IPs in products or processes (Table 2).

It is important to recognise that a productive and sustainable agriculture sector is critical to achieve economic growth and poverty reduction. Farmers and professional scientists continuously use the native biological sources, often recombine them as inputs to create new varieties or new processes based on traditional knowledge to combat biotic agents in order to sustain productivity as economic and environmental conditions change[5]. These researches are often supplemented by the contribution of farmers or grassroot innovators. Thus, the primary inputs for the agricultural systems are from the very biodiversity of which agrobiodiversity is a part[6]. This part feeds, nurtures people and includes genetic resources (GR) for food and agriculture, livestock, fish and non-domesticated resources for all ecosystem[7]. GRs have traditionally been made available on unrestricted basis and have contributed immensely in many fields of plant protection like biological control, microbial pesticides, and in engineering of resistant plants.

However, the developments towards providing a better platform for international trading including agriculture have led to private property rights and have necessitated the need to re-look at the present framework for the issues like ownership of these resources. Apprehensions on marked dichotomy between use of unrestricted biological resources and property rights regimes are becoming conscientious issues leading to questionable access to control on and ownership of agrobiodiversity[8] especially in the developing countries including India. Monopolies on new technologies have resulted in problems of excess ownership rights and mandatory gains[9].

2. AGRICULTURAL INNOVATIONS SYSTEMS

2.1 Legal Mechanisms in India

India has made significant progress in its domestic legal framework in the last ten years. The objectives and obligations of the signatories of each legal entity have been tabulated in Table 2. After a prolonged debate on the *Sui Generis* option under Article 27.3 (b) of the TRIPs Agreement, India's response to its obligations was finally promulgated as the Protection of Plant Varieties and Farmers' Rights Act, 2001. This is perhaps the most progressive act in plant variety protection (PVP) adopted by a developing country. The will to provide equal rights to breeders and farmers is considered farsighted insofar as it indicates a clear understanding that shaping the new regime requires assignment of property

Table 1. Various international treaties/conventions affecting agriculture innovation systems

Treaty/Agreements/ Convention	Objectives
Convention on International Trade in Endangered Species of Wild Fauna & Flora, 1975	Ensures international trade in specimens of wild animals and plants under strict regulation and to ensure their further survival
International Convention for the Protection of New Varieties of Plants, 1978; 1991	Grants and protects breeders' rights
Convention on Biological Diversity, 1992	▪ Conservation of biological diversity ▪ Sustainable use of its components (biological resources) ▪ Fair and equitable sharing of benefits arising out of utilisation of genetic resources
FAO-CGIAR Agreement, 1994	Designated germplasm held in trust in CG centres
Agreement on Trade-related Aspects of Intellectual Property Rights, 1995	▪ To promote effective and adequate protection of IPR ▪ To ensure IPR themselves do not become barriers to legitimate trade
Global Plan of Action (GPA), 1996	▪ Developed State of World's PGFRA ▪ 20 priority areas under four groups
Cartagena Protocol, 2000	Safe transfer, handling and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on conservation and sustainable use of biological diversity taking also into account the risks to human health, and specifically focusing on transboundary movements
International Treaty on Plant Genetic Resources for Food & Agriculture of FAO, 2001	▪ Conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA) ▪ Fair and equitable sharing of the benefits arising out of their use in harmony with CBD for sustainable agriculture and food security
Agreements on Sanitary and Phyto-sanitary measures	▪ Provides basic rights namely sovereign right, scientifically justifiable to protect the health and safety of their citizens, animals, plants and the environment in which they live as defined to the member countries ▪ Allows justified discrimination in contrary to non-discrimination of other agreements. These measures in any case would constitute a disguised restriction on international trade ▪ Provides harmonisation of the members to have standards based on international guidelines where ever they exist in compliance to Codex Alimentarius (CODEX), International Office of Epizootics (OIE) and International Plant Protection Convention (IPPC) which should be subjected to periodic review

rights to all concerned players where appropriation takes place[10]. With operationalisation of the Act with effect from October 2005, the onus now rests with the authorities to implement it in its true element.

The CBD had its origins in environmental concerns and recognises the members' sovereign rights over their natural biological resources. The IP issues form only a part of the concerns of CBD and address directly the origin, value, rights and benefits associated with the natural resources and the development of traditional knowledge. In order to address the challenges to India for asserting its rights over natural resources, the Biological Diversity Act 2002 (No.18 of 2003) aims to provide conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of the benefits arising out of the use of biological resources and knowledge. It strives to put limits on access to the biological resources or related knowledge including prior intimation to the National Biodiversity Authority (NBA) and State Biodiversity Boards (SBB). On issues of IPRs too, prior consent from the concerned authority is now required thus enforcing a certain amount of discipline

Table 2. Various legal mechanisms in India for agricultural innovative systems

Act	Objectives	Major Obligations
The Biological Diversity Act, 2002	▪ Promotion of conservation and sustainable utilisation ▪ Securing benefits for local people ▪ Regulation of access to biological resources of India	▪ Mandatory approval from National Biological Authority for access and use of biological resource occurring in India (Sec.3) ▪ Regulation by the Boards at national (Sec. 4) and at state levels (Sec. 7), for access, transfer or exchange of biological resources including use of genetic resource inventions and traditional knowledge (TK) (Sec.19) ▪ Committed to oppose grant of IPRs in any country outside India on any Indian Biological resource [Sec. 18 (4)] ▪ Application for any IPR resulting from invention based on research or information on biological resource obtained from India not to made without approval of National Biodiversity Authority (Sec.6, 19,20) ▪ Ensure equitable benefit sharing on benefits arising out of use of accessed biological resources, their byproducts, innovations and practices, knowledge in accordance with mutually agreed terms (Sec. 21)
The Protection of Plant Variety & Farmer's Rights (PPV&FR) Act, 2001	▪ To establish an effective system for protection of plant varieties, the rights of farmers and plant breeders ▪ To encourage the development of new varieties of plants	▪ To establish an authority (PPVF&FR Authority) (Sec. 3) to provide for registration of extant varieties, developing characterisation and documentation of varieties registered, farmers' varieties and compulsory cataloguing facilities of all varieties (Sec. 8) ▪ Establish Plant Varieties Registry (Sec. 12) ▪ Maintain national register of plant varieties (Sec. 13) ▪ Process for registration of plant varieties found confirming to criteria laid for eligible applicants (Sec. 14 to 22) ▪ Ensure farmers rights (Sec. 39) and Rights of Communities (Sec. 41)
Indian Forest Act, 1927; Wild life Protection Act,1972; Environment Protection Act, 1986; Coastal Regulation Zone Rules, 1991, Andaman & Nicobar Islands	Diverse biodiversity-trade ranges from live animals/ plants to products	▪ MoEF–Reg. Deputy ▪ Directors (Wildlife Preservation)–Issue permits for trade ▪ CMFRI ▪ All others for protection of flora/fauna in India
Biosafety Clearing House Mechanism–MoEF	National node for adhering to stipulations in CP	▪ AIA; Biosafety clearing house ▪ Documentation of risks to environment
Indian Patent Act, 1970; 1999; 2002 & 2005	Novel, inventive and useful innovations	▪ Law of land ▪ Disclosure of source of origin ▪ Written disclosure on origin and source of genetic resources ▪ Deposit of biological materials in international depository authority (IDA) ▪ No grant for TK ▪ No patents for plants ▪ *Sui Generis* system for plants

to the IPR system. It also entitles the authorities to oppose grant of IPRs outside India on any biological resources obtained from India. Benefit sharing concept has also been integrated into the Act thus addressing rights of holders of local knowledge and helping towards facilitating better living standards to benefit claimers (BD Act, 2002). The present tools for implementation are material transfer agreements (MTAs), prior informed consent (PIC), and applications for import/export of materials between countries. Since India is a party to the Convention and as a consequence of enactment of BD Act, 2002, the Government of India notified the Biological Diversity Rules, 2004. The essence is now on guidance and compliance by the stakeholders. This Act fulfils the Indian obligations under CBD-TRIPS regime with the main aim to protect biological diversity for sustainable use and to uphold the sovereignty over the biological resources of the country.

The WTO-TRIPS Agreement of 1995, which is binding on all member countries, provides minimum norms and standards in respect of protection of IPRs in several categories: patents, copyrights, trademarks, geographical indications, industrial designs, layout designs of integrated circuits, and trade secrets. TRIPS incorporates provisions from many existing international IP agreements like the Paris and Berne Conventions. It also provided a transition period of five years (till 1 January 2000) to give effect to the provisions of the agreement. In the case of product patents in some areas of technology, this period was extended up to 1 January 2005. India had amended its various laws and acts (copyright law, patent act, trademark act, geographical indication of goods act, designs act, and semiconductor integrated circuits layout design act) to be in line with the minimum requirements specified by the Agreement. It may be recalled that prior to this Agreement innovations in living organisms (plants, animals) or the biological processes that produce them were not protectable as IP.

The patent law also excludes from patentability all inventions arising out of the use of traditional knowledge (Patent Act, 1970). The legal position on patents on plant parts, cells, cell lines, genes and mitochondria, all of which are already patentable in developed countries, is still in development stage, and initial case laws on this would clarify the thinking.

Based on the available options through the legal mechanisms in the present day innovation systems in India for agriculture, the possible IPs may be:

- Patents that can be used to protect and get benefits from their IP (with regard to their traditional-based innovations or inventions) or can be used to defend their traditional knowledge (in instances where the existence of traditional knowledge as prior art is revealed during the examination of a patent application, thereby providing grounds for refusal).
- Geographical indications and trademarks, which could be used to protect plant protection products derived from traditional knowledge in rural sector and can offer a strong element of cultural identification.
- Trade secrets, which could protect traditional agri-based knowledge, especially where such knowledge is held exclusively by a particular group within a community towards crop protection.
- Designs, which can protect the delivery mechanisms used in agriculture like pest control, fertiliser applications.
- Agreements and contracts based on principles of prior informed consent (PIC), mutually agreed terms (MAT), which can pave for amicable modus operandi in the highly complex and dynamic environment of high-end agricultural research leading to development of technological innovations and products derived from the use of various biological resources. It is necessary to realise that a great care must be taken to ensure that the rights provided are neither insufficient nor excessive in terms of enhancing social and economic welfare. They can perhaps lead to reducing rate of innovation, which may be a roadblock

in the race to keep pace with global developments. However, the present attempts in India are to balance and adopt a wait and watch approach as the statutory system evolves.

Even as the emerging framework gets evolved, it is unclear whether farming community can exercise its right to oppose grant of patent or IP. It is also unclear what kind of evidence is needed to prove priority and how these three legislations would ensure access and benefit sharing (ABS). The grants of patent rights on wound healing properties of turmeric **(**US Patent 5,40,1,504), fungitoxic properties of neem extract (EP No. 43,6257) or on basmati rice (US Patent 5,66,3,484)[11] and several other cases indicate the dangers that patents or IPs can create in biopiracy rather than bioprospecting[12,13]. There is a need for digital databases of aforesaid registration, to link local information to global, and from one agency to another and a need to constantly search Indian and global databases of IPR application claims. This electronic vigilance will help NBA and other agencies to locate any claims infringing on prior local knowledge, so as to oppose the grant of IPR protection.

3. DOCUMENTATION OF BIOLOGICAL DIVERSITY

Yet another way for promoting sustainable use and equitable benefit sharing while conserving the biological diversity is the Peoples Biodiversity Register. Several agencies have independently initiated registration of biodiversity knowledge and management priorities of various social sectors to foster sustainable development and to protect the local interests against the global interests through conciliatory rather than conflicting approach[14]. Table 3 gives a tabulation of some efforts of documentation of biological resources and associated traditional knowledge in the country.

From the foregoing, it is evident that IPRs, especially patents, can stimulate industrial interest in natural products. India is a potential area for several players to enter and take advantage of its rich bio-heritage. While it is essential that an enabling environment is needed to attract more capital for such ventures, it is necessary to ensure within this IPR regime, that the objectives of the CBD are attained and governance climate helps conserve through sustainable use of the biodiversity and provide rights to the providers[15]. The analysis of *Kani-Jeevani*, the first case of benefit sharing model in India, reveals the positive attitude of the patent holder (Tropical Botanic Garden and Research Institute) to share the license fee and royalty generated on drug, '*Jeevani*' with the tribe, *Kani*[16]. The tribe was acknowledged as holders of the knowledge of properties of extract called '*Jeevani*' from the plant *Trichopus Zeylanicus*. But the major obstacle was the slow and tortuous process in the government to formulate the process of transfer of the benefits[17]. The other hurdle was the claim of the Forest Department for the share in the royalty benefits in view of the fact that the land where the plant was growing belonged to the Forest Department. But, it is illegal picking by the outsiders, which is damaging the plant population. Hence, while this is a successful model of benefit sharing and recognition of contributions of traditional knowledge holders, equitable benefit sharing and sustainable use of biodiversity cannot easily be achieved unless the sovereign governments recognise the basic rights of the people and help through an 'enabling environment'.

4. CONCLUSION

It is evident that the policy environment and governance affecting agriculture at large and agri-based products in particular is undergoing a significant change during the past decade. All stakeholders of agricultural research in India need to be aware of the statutory requirements as they develop new products and processes. The system needs to be able to support knowledge holders in rural communities who often lack the knowhow and financial resources to take advantage of the IP system, either in its present or in any further evolved form. For this, it is essential to develop next generation manpower in IP management as related to agri-based activities. Public organisations would need to provide the technological backstopping to knowledge

Table 3. Documentation of biological resources and associated TK in India

Activity/Year launched	Agency	Type of Agency	Description of activity undertaken
National Biodiversity and Strategy Action Plan, 1999	Ministry of Environment and Forests, UNDP; *Kalpavriksh*; Biotech Consortium, India	Public-Private	Assessment and stock-taking of biodiversity-related information at national and state levels
National Innovation Foundation, 2000	Dept. of Science & Tech. Indian Institute of Management (IIM)	Public	Register and support grass root innovations
Biodiversity Plan	Govt of Karnataka	Public	State laws on biodiversity
Mission Mode Project on collection, documentation and validation of indigenous technical knowledge, 2002- 03	Indian Council of Agricultural Research	Public	Documentation and registration of TK
TK Digital Library (TKDL), 2006	Council of Scientific & Industrial Research	Public	Int. Library on Traditional Knowledge
People's Biodiversity Registers, 1995	Foundation for Revitalisation of Local Health Traditions	NGO	Records the status, uses and management of living resources
Community Biodiversity Register, 1995	Indian Institute of Science	Public	Provides spaces for the rights to communities about their biological and cultural heritage
Conservation Movement	Research Foundation for Science, Technology and Ecology	NGO	Agro-biological conservation of indigenous varieties; 32 community seed banks
Movement for Securing Benefits for Local Communities	Gene Campaign	NGO	Collection, characterisation traditional varieties and practices
Movement for Securing Benefits for Local Communities	Several other NGO's, peoples movement-formal/informal	Private	Recognition of TK/practices, conservation, identifying holders of knowledge
Honey Bee Network, 1996 National Biodiversity and Strategy Action Plan, 1999	*Sristi*	NGO	Document innovative practices of farmers/ artisans
Database	MS Swaminathan Research Foundation	Private	Document contributions of tribal groups for securing benefits
Village Registry, 1997	Pattuvam Village, Kerala	Public	Produced a registry of genetic resources (GR)
Registration of Plant Germplasm, 1996	NBPGR, ICAR	Public	Provides recognition to those associated with the development and identification of improved or unique germplasm and genetic stocks and is considered as defensive or soft protection option

Source: Collected and compiled from various sources by the author.

the technological backstopping to knowledge holders and innovators by awareness programmes on IP creation and national non-IP instruments like knowledge registers and databases, thus helping in staking claims of national sovereignty. Along with this, it is essential that they help channelise assistance for legally backed contractual agreements, developing prior informed consent (PIC) and MTAs in case of partnerships including benefit sharing between individual knowledge holders and major industrial players.

Apart from these, all agencies including public, private, and NGOs need to don a role of watchdog and take preemptive steps for protection of large biodiversity by associating with regulatory authorities like the SBB, BMC, NBA, Protection of Plant Variety and Farmers' Rights Authority, etc., in the country. In the light of these, there is a need to recast the mandates of such institutions and to take measures to meet the challenges related to issues on IP protection in agriculture in the country in order to create and sustain economically viable opportunities in the intensely competitive trading circles with ensured livelihood to the relevant stakeholders in India.

REFERENCES

1. Fravel D.R.; Rhodes, D.J. & Larkin, R.P. Production and commercialisation of biocontrol products, edited by R. Albajes, *et al.*, Dordrecht, 1999, pp. 365-76.

2. Dutfield, Graham. Intellectual property rights, trade and biodiversity: The case of seeds and plant varieties. *In* Convention on Biological Diversity and the International Regime. 28-30 June 1999, Montreal, Canada, pp.1-97.

3. Ruiz, Manue. Access to genetic resources, intellectual property rights and biodiversity: Processes and synergies. *In* 7th meeting of Conference of Parties to Convention of Biological Diversity. (Also available at http://www.iucn.org/themes/pbia/wl/docs/trade/ipsdweek_may04/PGCS_ TB_Ruiz.pdf).

4. Cooper, H.D. & Anishetty, Murthi N. International treaties relevant to the management of plant genetic resources. Encyclopedia of Plant and Crop Science. Marcel Dekker, 2004.

5. Ramanna, Anitha. IPRS and agriculture: South Asian concerns. *South Asia Economic Journal,* 2003, **4**(1).

6. Tiwari. S.P. Regulatory and operational mechanisms as related to agrobiodiversity. Second and revised edition. NAARM (ICAR) Publication, New Delhi, 2006, pp.1-216.

7. Shand H. Human nature–Agricultural Biodiversity and Farm-based Food Security. RAFI, Ottawa, 1997.

8. Ramanna, Anitha. India's plant variety and farmers' rights legislation: Potential impact on stakeholder access to genetic resources. EPTD Discussion Paper No. 96, 2003, 40 p.

9. Mbote, AnneKameri & Cullet, Phillippe. Agrobiodiversity and international laws–A conceptual framework. *Journal of Environmental Law,* 1999, **11**(2), 257-79.

10. Cullet, Phillippe & Koduru, Radhika. Plant variety protection and farmers rights: Towards a broader understanding. Delhi Law Review 2002, Delhi, 2003, pp. 41-54 (Also available at http://www.ielrc.org/content/a0304.pdf).

11. Sastry, Kalpana R. Patenting of basmati rice—Status and implications for IPR regime in India. Working Paper No.1. NAARM, Hyderabad, 2005, 20 p.

12. India wins neem patent case. *The Hindu.* 9 March 2005 (Also available at http://www.hinduonnet.com/2005/03/09/stories/2005030902381300.htm).

13. Vani, K.P. & Sastry, Kalpana R. Case analysis of USPTO patent grant 5,401,504. *In* Proceedings of 93 Session of Indian Science Congress. Hyderabad, 2006.

14. Ramanna, Anitha & Smale, Melinda. Rights and access to plant genetic resources under India's new laws. *Development Policy Review,* 2004, **22**(4), 423-42.

15. Gupta, Anil K. Rewarding creativity for conserving diversity in third world: Can

IPR regime serve the needs of contemporary and traditional knowledge experts and communities in third world? *In* Strategic Issues of Industrial Property Management in a Globalising Economy, edited by Thomas Cottier, *et al.* Hart Publishing, 1999, pp.119-129.

16. Pushpangadan, P.; Rajasekhran, S. & George, V. Benefit sharing with Kani tribe: Model experimented by Tropical Botanic Garden and Research Institute. Paper presented at International Conference on Medicinal Plants, 16-19 February 1998. National Institute of Advanced Studies, Bangalore.

17. Bagla, P. Bioprospecting: Model Indian deal generates payments. *Science,* 1999, **283**(5408), 1614-15.

Contributor

Dr R. Kalpana Sastry obtained her MSc (Mycology and Plant Pathology) from the Indian Agricultural Research Institute, New Delhi. Later, she completed her PhD in the same subject and joined the Indian Council of Agriculture Research, New Delhi, in 1984. Till 1996, she worked as Plant Pathologist researching in disease management areas in oilseeds and plantation crops. Her work was part of the Govt of India's Technology Mission Programme on Oilseeds. In 1996, she joined National Academy of Agricultural Research Management, Hyderabad, where she is working in Agricultural Research Systems Management Policy Division as the Principal Scientist. She was a FAO Fellow, Asian Institute of Technology, Bangkok in Educational Technology (May-August 2000). A holder of PG Diploma in Patent Law from the National Academy of Legal Studies and Research (NALSAR), she is actively involved in research centering policy issues in thfor the National Agricultural Research System in India. In addition, she is part of the team for facilitating IP portfolios for stakeholders like farmers, and traders' organisations. Patent facility services from her team have been rendered to several scientists and farmers in National Agricultural Research System of India. She is a recognised faculty on IP and WTO issues in agriculture at national and international fora. Her areas of interest include agricultural innovation and intellectual property systems.