



# Intellectual Property Management Regime in the Indian National Agricultural Research Systems

**A Case Study**  
*Under NAARM-CAS-IP NPI Collaboration Project*

**R.Kalpana Sastry**  
Principal Scientist

NAARM  
Email: [kalpanas.regulagedda@gmail.com](mailto:kalpanas.regulagedda@gmail.com)  
[kalpana@naarm.ernet.in](mailto:kalpana@naarm.ernet.in)

**National Academy of Agricultural Research Management**

Indian Council of Agricultural Research  
Rajendranagar, Hyderabad 500407, Andhra Pradesh, India  
Phone 091+40+24581300 & 24581444  
Fax 091+40+24015912 & 091+40+24015926  
E-Mail: [naarm.hyd@naarm.ernet.in](mailto:naarm.hyd@naarm.ernet.in)

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## Executive Summary

This case study presents an overview of the changing environment for public research organizations in the Indian Agricultural Research System with respect to intellectual property management. The National Agricultural Research System (NARS) in India continues to fulfil its commitment to cater to its broader societal objectives. However, the dimensions of dealing with growing sovereignty and restrictions on the sharing of germplasm, privatization of knowledge, and pressures to reduce demands on public finances through the commercialization of research products are new challenges to the system.

A review of the relevant legal and policy documents was done to understand the background of the obligations at national and at the international level. This was followed by a brief review of the role and functions played by some statutory agencies in India that are actively involved in IP facilitation. Later the National Agricultural Research System was studied with an intention to understand the complexities and magnitude *vis-a-vis* the IP policy. Then the provisions and governance model of the new IP policy of the ICAR was analyzed. Thus, the principles and strategies for intellectual property management as adapted from the Laws in India through the ICAR guidelines on IP and Technology Management are outlined.

Against this background, two constituent institutes of ICAR, namely, Project Directorate of Poultry (PDP) and Directorate of Rice Research (DRR), animal-based and crop-based institutes respectively, were studied in detail from the IP policy perspective. The study highlights on the implementation of guidelines, structural adjustments in decision-making activities in IP management at institutes and at understanding the specific issues of IP management relevant to the research mandate of these institutes.

## Acronyms

ADG	Assistant Director General
AICCP	All India Coordinated Crop Improvement Project
AICRIP	All India Coordinated Rice Improvement Project
AICRP	All India Coordinated Research/Network Projects
AIMS	Agriculturally Important Microbes
AnGR	Animal Genetic Resources
ATMC	Agro-Technology Management Centre
AVT	Advance Varietal Trial
BARC	Bhabha Atomic Research Centre
CARI	Central Avian Research Institute
CAS	Central Advisory Service
CBD	Convention on Biological Diversity
CDFD	Centre for DNA Finger Printing and Diagnostics
CGIAR	Consultative Group on International Agricultural Research
CGPDT	The Controller General of Patents Designs and Trademarks
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo
CITES	Convention on Trade in Endangered Species
CODEX	Codex Alimentarius
CP	Cartagena Protocol on Biosafety
CSCS	Central Sub-Committee on Crop Standards
CSIR	Council of Scientific & Industrial Research
CTMC	Central Technology Management Committee
DARE	Department of Agriculture Research and Education
DBT	Department of Biotechnology
DNA	Double helix Nucleic Acid
DRR	Directorate of Rice Research
DST	Department of Science and Technology
DUS	Distinctness, Uniformity and Stability
ENV	Extent Notified Rice Varieties
FAO	Food and Agriculture Organization
FV	Farmers' Variety
GADVASU	Guru Angad Dev Veterinary and Animal Sciences University
GATT	General Agreement on Trade and Tariffs
GDP	Gross domestic product
GI	Geographical Indications
GIR	Geographical Indications Registry
GMO	Genetically Modified Organisms
GPA	Global Plan of Action
GURT	Genetic Use Restriction Technology
IARI	Indian Agricultural Research Institute
IC	Integrated Circuit
ICAR	Indian Council of Agricultural Research
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
ICT	Information and Communication Technology
IET	Initial Evaluation Trial
IFPRI	International Food Policy Research Institute
IP	Intellectual Property
IPAB	Intellectual Property Appellate Board
IPC	International Patent Classification
IPPC	International Plant Protection Convention

IPR	Intellectual Property Rights
IRC	Institute Research Council
IRRI	International Rice Research Institute
ITMC	Institute Technology Management Committee
ITMU	Institute Technology Management Units
ITPGRFA	International Treaty on Plant Genetic Resources for Food And Agriculture
IVRI	Indian Veterinary Research Institute
IVT	Initial Varietal Trial
KAU	Kerala Agricultural University
KTKA	Kerala Traditional Knowledge Authority
KVAFSU	Karnataka Veterinary, Animal and Fisheries Sciences University
KVK	Krishi Vigyan Kendras
LMO	Living Modified Organisms
MDG	Millennium Development Goals
MHRD	Ministry of Human Resource Development
MoCI	Ministry of Commerce and Industry
MoCIT	Ministry of Communications and Information Technology
MoEF	Ministry of Environment and Forests
MOU	Memorandum Of Understanding
MTA	Material Transfer Agreement
NAARM	National Academy of Agricultural Research Management
NAIP	National Agricultural Innovation Project
NARO	National Agricultural Research Organization
NARS	National Agricultural Research Systems
NBA	National Biodiversity Authority
NBAGR	National Bureau of Animal Genetic Resources
NBFGR	National Bureau of Fish Genetic Resources
NBPGR	National Bureau of Plant Genetic Resources
NDUS	New Distinctness, Uniformity and Stability
NEH	North Eastern Hill region
NIIPM	National Institute of Intellectual Property Management
NPA	National Policy on Agriculture
NPI	National Partner Initiative
NRSA	National Remote Sensing Agency
NRV	Notification and Release of Varieties
PCT	Patent Co-operation Treaty
PDP	Project Directorate of Poultry
PGRFA	Plant Genetic Resources for Food and Agriculture
PIS	Patent Information System
PPV &FR	Protection of Plant Varieties and Farmers Rights
PVP	Plant Variety Protection
QRT	Quinquennial Review Team
QTL	Quantitative Trait Locus
SAU	State Agricultural Universities
SBB	State Bio-diversity Board
SCIP	Supervisory Council on Intellectual Property
SICLD	Semiconductor Integrated Circuits Layout-Design
SICLDR	Semiconductor Integrated Circuits Layout-Design Registry
SKUAST	Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir
SPS	Sanitary and Phyto-Sanitary Measures

SRC	Staff Research Council
SVRC	State Variety Release Committee
SVVU	Sri Venkateswara Veterinary University
TRIPS	Trade Related Intellectual Property Rights
TQ	Technical Questionnaire
UGC	University Grants Commission
UPOV	International Union for the Protection of Plant Varieties
USA	United States of America
USC	Unites States Code
USPTO	United States Patent and Trademark Organization
VIC	Variety Identification Committee
WCT	WIPO Copyrights Treaty
WIPO	World Intellectual Property Organization
WPPT	WIPO Performances and Phonograms Treaty
WTO	World Trade Organization
ZITMC	Zonal Institute Technology Management Committee
OIE	International Office of Epizootics

# 1 Introduction

## 1.1 Background

The National Academy of Agricultural Research Management (NAARM), a constituent of Indian Council of Agricultural Research and also part of National Partner Initiative (NPI) of Central Advisory System/Intellectual Property (CAS/IP) was invited by CAS/IP to undertake a case study in order to understand the system and document the lessons learnt, the challenges present and the experiences gained in the process of operationalising the Intellectual Property (IP) management guidelines in the Indian NARS. Accepting this invitation NAARM undertook the assignment with an aim at understanding and explores modalities to improve the effectiveness of the IP management and technology transfer guidelines in agriculture based public sector institutions in India.

## 1.2 Goal of the Study

The goal of the study is to contribute to improving the newly established policy framework and guidelines for the systematic management of IP assets and technology transfer in National Agricultural Research System (NARS) in India.

## 1.3 Purpose of the Study

The study aims at understanding and also explores modalities to improve the effectiveness of the IP management and technology transfer guidelines in agriculture based public sector institutions in India

## 1.4 Evaluation Process

The study involved collection and reviewing of existing literatures and documents related to establishment and operationalization of the ICAR guidelines for IP management and technology transfer /commercialization in Indian NARS.

Detailed information relevant to the objectives set was elicited through:

### 1.4.1 Information Collection

- Identifying the technology from two institutes in NARS for building a IP portfolio
- Review of relevant, legal and policy documents through secondary sources.
- Administration of questionnaire survey (Annexures i to iv).
- Interviews and discussions with IP practitioners, officials of the statutory bodies, academicians, seed producers, farmers/group of farmers to obtain their views on the need and implementation of IP guidelines.
- Participation and discussions in ICAR Training-cum-Workshop on IP and Technology Management held at various institutes between June to December 2008.
- Visit both the constituent-institutes identified for the study and interact with concerned sections.
- Critical analysis and synthesis of the collected information. This synthesis was then discussed again with the concerned departments in the two institutes and a consolidated checklist prepared.

### 1.4.2 Information Analysis

Based on the final discussions, a strategy for operationalising IP policy for these two institutes was prepared.



## 1.5 Outline of the Report

The report starts with a brief introduction to the IPR regime in India and its relevance to agricultural systems. A review of the relevant legal and policy documents was done to understand the background of the obligations at national and at the international level. This was followed by a brief review of the role and functions played by some statutory agencies in India that are actively involved in IP facilitation. In the fourth chapter, the National Agricultural Research System was studied with an intention to understand the complexities and magnitude *vis-a-vis* the IP policy. Then the provisions and governance model of the new IP policy of the ICAR was analysed. Two constituent institutes, namely Project Directorate of Poultry (PDP) and Directorate of Rice Research (DRR), animal- based and crop-based institutes respectively were studied in detail from the IP policy perspective. Most of the discussion has been focussed on the implementation of guidelines, structural adjustments in decision-making activities in IP management at institutes and at understanding the specific issues of IP management at these institutes.

## 2. Intellectual Property Rights and Agricultural R&D Scenario

*"An inventor had no special advantage from his own invention. The patent system changed this; secured to the inventor, for a limited time, the exclusive use of his invention; and thereby added the fuel of interest to the fire of genius, in the discovery and production of new and useful things."- Abraham Lincoln, Second lecture on discoveries and inventions. February 11, 1859*

Intellectual Property Rights (IPRs) can play a significant role in achieving the United Nations Millennium Development Goals (MDGs), as they affect agricultural and rural development in developing countries. The main impact of IPRs is through their relationship with the transfer of traditional and modern agricultural technologies, and making IPRs support rather than hinder sustainable development. However, developing countries like India have a less homogeneous agro-socio-economic environment in which farmers operate. While it is now accepted that IPRs can help stimulate economic growth and reduce poverty, there are still inherent fears on a more negative impact of these in Indian Agriculture. The functioning of IPR systems raises genuine concerns especially in the changing models of agricultural research, which are now emerging in partnership mode with multiple agencies. All systems including the public sector systems may incur considerable costs, time and money, and need to ensure conducting research without infringing upon others' IP rights, or defending their own IP rights against other users. This raises questions as to whether the substantial costs involved in IP litigation are a necessary price to pay for the incentives offered by the IP system, or whether ways can be found to reduce them. How does this proliferation of Intellectual Properties (IPs) affect competition and research? The concerns about the impact of IP are now becoming important for research outcome auditing. The importance of intellectual property protection to develop the scientific and technological capacity of developing countries and benefits derived from the enhanced level of growth has now become a matter of common understanding. IP systems management is strong determinant of economic growth of a nation as it helps entrepreneurs recover costs of their innovative expenses<sup>1</sup>.

### 2.1 Research and Development Scenario in India

Since independence, India has tried to effectively use science and technology for its advancement as major economy in the world. The ushering of "Green Revolution" to support the country's efforts for increasing food productivity has been to due timely interventions based on scientific acumen and technology. Despite these successes, newer challenges like declining and degenerating natural resources, increasing population, and emphasis on quality food, nutrition, healthcare and access to better livelihoods are surmounting. There is a growing need to be able to meet these through adoption of newer technologies including biotechnological approaches.

### 2.2 Impacts of Global Changes

Several changes at global level after advent of WTO, has started to build technology-led enterprises with knowledge, as an asset fetching remunerations. Research today is poised to come out of its sheltered existence to a more open era and help institutions face competition. The agricultural research requires pursuit of excellence through innovation, technology development, evaluation and refinement. While the IPR system can provide pursuit for effective competition, there is bound to be some parallax. Issues like public good versus private right; food and nutrition security versus industrial agriculture; public disclosure of

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<sup>1</sup> Laik, Kaushik.2005.Role of Intellectual Property in Economic Growth. Journal of Intellectual Property Rights.Vol.10, November.2005.pp465-473.

information/specification for seeking IPR versus holding back the know-how for better bargain in licensing contracts are conflicting zones of operation. This is more challenging in public research systems in agriculture. Until 1989 India refused to enter into detailed negotiations on standards. But the threat of unilateral retaliatory trade sanctions played a role in changing the stand of many developing countries on this matter<sup>2</sup>. Thus, India has amended all the relevant legislations for the various forms of intellectual property as per the mandatory requirements of World Trade Organization (WTO) by January 1, 2000<sup>3</sup>. The time frame for implementation was 2005 and the necessary rules for process of implementing the acts have now been completed.

## 2.3 Impact on Agriculture R&D

With the framing, enacting and operationalization of all these legislations, and India becoming compliant with TRIPS, the onus is now on the research systems including those in agriculture to use these provisions in their research programs and build strong IP instruments where required. On the same plane, the issues towards defence of indigenous innovation and the recognition of the contribution of our biodiversity are also interwoven in IP building for researches based on agro-biodiversity. Articles 8 and 15 of the Convention on Biodiversity (CBD) center on the theme of the sovereign rights of states over their natural resources. Article 8(j)<sup>4</sup> is particularly important because it recognizes the rights of indigenous farming communities in India and their traditional knowledge and practices. Article 15 of the CBD, regarding access to genetic resources, is also important for providing a framework for regulating access to genetic resources and their use by foreign organizations and corporations. As per TRIPS, the issue of ownership is to be determined by national law, by creating an institutional framework and helping safeguarding the rights of local people. It would make it mandatory for such corporations to share their profits with the indigenous communities.

### 2.3.1 The Last Ten Years

Notwithstanding these challenges, a decade after India launched its innovate-and patent campaign, there are signs of early success<sup>5</sup>. The Science and Technology Policy of the Government of India was announced in 2003 and aims at establishing an intellectual property regime which maximized the incentives for the generation and protection of IP by all types of innovators<sup>6</sup>. Similarly the predominantly publicly funded agricultural research system in India needs a IP policy framework<sup>7</sup> and the National Agricultural Research System (NARS) is in the process of developing IPR management strategies for effective transfer of IP protected technologies<sup>8</sup>. The Protection and Utilisation of Public Funded Intellectual Property

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<sup>2</sup> For example, China, Brazil, India, Taiwan and Thailand were "investigated" under the 'Special 301' section of the US Trade Acts, and many other countries (e.g. Argentina, Andean Group countries) were repeatedly threatened with trade sanctions in order to obtain changes in their IPR regimes. USA, in fact lodged a complaint with DSB at WTO in 1996 on non-compliance by India that was upheld even after an appeal.

<sup>3</sup> Kalpana Sastry. 2007. Mechanisms of Protection of Agricultural Innovations in India. DESIDOC Bulletin of Information Technology .27(6): 3-11.

<sup>4</sup> This article enunciates three rights. First, it acknowledges farmers' traditional rights over their biological resources. Second, it stipulates that wider application of farmers' knowledge, innovations and practices is subject to their approval and involvement. Third, it calls for the equitable sharing of ensuing benefits. All three rights, needed to be embodied in a national legislation, and can provide ownership and protection of local resources. India ratified as a party to CBD in 1994.

<sup>5</sup> The purchasing of patent for Indian designed software that eliminates noise from complex digital data by a US company and that of a pomegranate deseeder invented by college drop out by a fruit growers of California and Turkey indicate early successes of the regime which is slowly evolving. See: Ganapati Mudhur. 2006. India's 10-year patent drive. Technology Review. September/October.2006 pp18-19.

<sup>6</sup> The Science and Technology Policy, 2003, Govt. of India clearly states the intellectual property rights have to be viewed as an effective policy instrument that will be relevant to wide ranging socio- economic technological and political concepts.

<sup>7</sup> Rao, N.H. and R.Kalpana Sastry.2004. Towards a Policy for Management of Intellectual Property in Public Agricultural Research Systems in India. Journal of Intellectual Property Rights Vol. 9.May 2004 pp 242-259.

<sup>8</sup> The Director General, Indian Council of Agricultural Research (ICAR) had constituted a committee in November 2005 for developing the organization's IPR guidelines. These have now been developed and implemented in national agriculture research institutions under ICAR since October, 2007.

Bill 2008, introduced by Science and Technology Ministry in December 2008, in Rajya Sabha<sup>9</sup> aims to develop a framework for protection and utilisation of intellectual property created out of public funded research and development. Currently the national government controls the rights to IP developed at academic or research institutions with the support of public funds. The bill proposes that the inventing institution be assigned these rights. This is based on the provisions of the Bayh-Dole Act in the United States of America (USA)<sup>10</sup> and seeks to provide for a funding agreement between the government and the recipient before release of grant for research and development. Besides seeking to bar public disclosure, publication and exhibition of the public funded intellectual property, the Bill lists duties of the recipient who retains the titles.

Against such a background of paradigm shifts in national research scenario, it becomes imperative to monitor the initiatives for catalysing the changes in positive manner and take corrective steps in a timely manner. The present study is an attempt in this direction.

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<sup>9</sup> Upper House of the Indian Parliament

<sup>10</sup>The Hindu Business Line. 2008. Bill for protecting IPR in public funded research in RS. Monday, December 15, 2008.

### 3. Review of Relevant Legal and Policy Documents

*"A country without a patent office and good patent laws is just a crab and can't travel any way but sideways and backwards."-  
Mark Twain in his book, A Connecticut Yankee in King Arthur's  
Court (1889)*

#### 3.1 Global Context

Over last few decades, several agreements at various international fora have been negotiated and adopted in order to enhance and better the livelihoods and help nations achieve the targets set in Millennium Development Goals. Some of these are of direct relevance to sustainable agriculture, enhanced trade and ensuring better environment. These include Convention of Biological Diversity (CBD), 1992; Convention on Trade in Endangered Species, 1973 (CITES); 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, 1994 (TRIPs); and The International Treaty on Plant Genetic Resources for Food And Agriculture, 2001 (ITPGRFA)<sup>11</sup>. 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. Concurrently, new emerging regimes in protection mechanisms for innovations at the global levels are impacting the access, transfer, and use of biological and /genetic resources for furthering the research and developmental activities in all fields of agriculture (Table 3.1).

**Table 3.1. International Treaties/Conventions affecting Agriculture Innovation Systems**

	<b>Treaty / Agreements/ Convention</b>	<b>Objectives</b>
1.	Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES), 1975 <a href="http://www.cites.org/">http://www.cites.org/</a>	<ul style="list-style-type: none"> <li>▪ Ensure international trade in specimens of wild animals and plants under strict regulation and not endanger their further survival</li> </ul>
2.	International Convention for the protection of new varieties of plants (UPOV), 1978; 1991 <a href="http://www.upov.int/index.html">http://www.upov.int/index.html</a>	<ul style="list-style-type: none"> <li>▪ Grant and protect breeders rights</li> </ul>
3.	Convention on Biological Diversity (CBD), 1992  <a href="http://www.biodiv.org/default.shtml">http://www.biodiv.org/default.shtml</a>	<ul style="list-style-type: none"> <li>▪ Conservation of Biological Diversity</li> <li>▪ Sustainable use of its components (biological resources)</li> <li>▪ Fair and equitable sharing of benefits arising out of utilization of genetic resources</li> </ul>
4.	FAO-CGIAR Agreement, 1994	<ul style="list-style-type: none"> <li>▪ Designated germplasm held in trust in CG centers</li> </ul>
5.	Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) , 1995 <a href="http://www.wto.org/English/docs_e/legal_e/legal_e.htm">http://www.wto.org/English/docs_e/legal_e/legal_e.htm</a>	<ul style="list-style-type: none"> <li>▪ To promote effective and adequate protection of IPR</li> <li>▪ To ensure IPR themselves do not become barriers to legitimate trade</li> </ul>
6.	Global Plan of Action (GPA), 1996 Adopted by 150 countries	<ul style="list-style-type: none"> <li>▪ Developed State of World's PGFRA</li> <li>▪ 20 priority areas under four groups</li> </ul>

<sup>11</sup> Cooper, H.D. and N. Murthi Anishetty. 2004. International Treaties relevant to the management of Plant Genetic Resources. Encyclopedia of Plant and Crop Science Marcel Dekker .

	Treaty / Agreements/ Convention	Objectives
	<a href="http://www.fao.org/ag/AGP/AGPS/GpaEN/gpatoc.htm">http://www.fao.org/ag/AGP/AGPS/GpaEN/gpatoc.htm</a>	
7.	Cartagena Protocol, (CP), 2000 <a href="http://www.biodiv.org/biosafety/default.aspx">http://www.biodiv.org/biosafety/default.aspx</a>	<ul style="list-style-type: none"> <li>▪ 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 risks to human health, and specifically focusing on transboundary movements</li> </ul>
8.	International Treaty on Plant Genetic Resources for Food & Agriculture of FAO (ITPGRFA) 2001 <a href="http://www.fao.org/ag/cgrfa/itpgr.htm">http://www.fao.org/ag/cgrfa/itpgr.htm</a>	<ul style="list-style-type: none"> <li>▪ Conservation and sustainable use of plant genetic resources for Food and Agriculture (PGRFA)</li> <li>▪ Fair and equitable sharing of the benefits arising out of their use in harmony with CBD for sustainable agriculture and food security</li> </ul>
9.	Agreements on Sanitary and Phyto-Sanitary Measures (SPS) <a href="http://www.wto.org/English/tratop_e/sps_e/sps_e.htm">http://www.wto.org/English/tratop_e/sps_e/sps_e.htm</a>	<ul style="list-style-type: none"> <li>▪ Provides basic rights to the member countries 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</li> <li>▪ Allows justified discrimination in contrary to non-discrimination of other agreements These measures in any case would constitute a disguised restriction on international trade</li> <li>▪ Provides harmonization 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, but however, members.</li> </ul>

### 3.2 Indian Context

All these agreements have thus led 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 (39 of 1970), The Patents (Amendment) Act, 1999 (17 of 1999), The Patents (Amendment) Act 2002 (38 of 2002), The Patents (Amendment) Act 2005 (15 of 2005), The Geographical Indications of Goods (Registration & Protection) Act, 1999 and The Protection of Plant Varieties and Farmers Rights Act, 2001 (PPV FR Act) (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). Proper application and effective enforcement of these laws is the next challenge. Various ministerial departments under the Government of India are responsible for the administration of these Acts (Table 2). At present, there is no specific IPR Act to provide protection for undisclosed information (trade secret). The Indian Contract Act of 1872 and common law have provisions covering this. The Ministry of Law and Justice is the nodal agency for this purpose. In October, 2007, the Department of Science and Technology, Govt of India released draft version of the proposed National Innovation Act 2008<sup>12</sup>. This is to provide legislative framework

<sup>12</sup> The Preamble of National Innovation Act states as "An Act to facilitate public, private or public- private partnership initiatives for building an Innovation support system to encourage Innovation, evolve a National Integrated Science and Technology Plan and codify and consolidate the law of confidentiality in aid of protecting Confidential Information, trade secrets and Innovation" Indian Innovation Act: trade and confidentiality. Kamakhya Srivastava. October 8, 2008. Posted at: <http://www.cafezine.com/depts/article.asp?id=21215&deptid=6>

to protect trade secrets in India considering opportunities for trading in innovations. In addition, the biodiversity-IPR related matters are covered under the Biological Diversity Act, 2002 by the

**Table 3.2 Broad Institutional Mechanism of the Indian IPR Regime**

S. No.	IP	Legislation	Administration Authority	Nodal Agency
1.	Patent	The Patents Act, 1970	The Controller General of Patents Designs and Trademarks (CGPDT)/Controller of Patents	Department of Industrial Policy & Promotion (DIPP), Ministry of Commerce and Industry (MoCI)
2.	Design	The Design Act, 2000	The CGPD/Registrar of Designs	
3.	Trade Mark	The Trade Marks Act, 1999	The CGPDT/Registrar of Trademarks	
4.	Geographical Indication	The Geographical Indications (Registration and Protection) Act, 1999	The CGPDT/Registrar of Geographical Indications	
5.	Copyright	The Copyright Act, 1957	Director and Registrar of Copyright	Department of Secondary and Higher Education, Ministry of Human Resource Development (MHRD)
6.	Integrated Circuit Design	The Semiconductor Integrated Circuits Layout-Design Act, 2000	Registrar, Semiconductor Integrated Circuits Layout-Design Registry	Department of Information Technology, Ministry of Communications and Information Technology (MoCIT)
7.	Plant varieties	The Protection of Plant Varieties and Farmers' Rights Act, 2001	Protection of Plant Varieties and Farmers' Rights (PPV&FR) Authority/Registry	Department of Agriculture and Cooperation, Ministry of Agriculture
8.	Undisclosed information	The Contract Act, 1872; Common (Civil) Law	Civil courts	Ministry of Law and Justice
9.	Biodiversity	The Biological Diversity Act, 2002	National Biodiversity Authority (NBA)	Ministry of Environment and Forests (MoEF)
10.	Traditional knowledge	None	Secretary of the concerned Ministry(ies)	MoHRD; MoCI

Source: Kochhar, Sudhir 2008<sup>13</sup>.

<sup>13</sup> Kochhar, Sudhir 2008. Institution and capacity building for the evolution of IPR regime in India: Protection of Plant Varieties and Farmers Rights. Journal of Intellectual Property Rights. Vol. 13, January 2008, pp.51-56

National Biodiversity Authority wherein the Ministry of Environment and Forests is the nodal agency. On the issues of traditional knowledge, two ministries of the central government, namely, the Ministry of Commerce and Industry and the Ministry of Human Resource Development, act as the nodal agencies for different matters.

### **3.3 Summary of Provisions under Various Acts for IPs in India**

#### **3.3.1 Copyright**

India has one of the most modern copyright protection laws in the world. The earlier 1994 amendment to the Copyright Act of 1957 had provided protection to all original literary, dramatic, musical and artistic works, cinematography, films and sound recordings. Through the amendment in 1999, to the Copyright Act of 1957 to make it fully compatible with the provisions of the TRIPS Agreement, a provision was made bring sectors such as satellite broadcasting, computer software and digital technology under Indian copyright protection.

The Copyright Act is now in full conformity with the TRIPS obligations<sup>14</sup>. It is called the Copyright (Amendment) Act, 1999 and came into force on January 15, 2000. The Indian law facilitates copyright protection to the creators of original works of authorship for: literary works (including computer programs, tables and compilations including computer databases which may be expressed in words, codes, schemes or in any other form, including a machine readable medium); dramatic, musical and artistic works and cinematographic films and sound recordings. However, a copyright law does not protect facts, ideas, systems, or methods of operation; although it may protect the way these things are expressed. A copyright protects the rights of authors, i.e. creators of intellectual property in the form of literary, musical, dramatic and artistic works and cinematograph films and sound recordings. The author is the first owner of copyright in a work. Under the Act, the author is the person who creates the work in the case of a literary or dramatic work; or composer in the case of a musical work; or the producer in the case of a cinematograph film; or the producer in case of sound recording or the photographer in the case of photograph; or the person who uses the work to be created in the case of a computer generated work. In the case of a work made in the course of the author's employment under a contract of service or apprenticeship, the employer shall, in the absence of any agreement to the contrary, be the first owner of the copyright therein. In addition, there are moral rights of an author also. The author of a work has the right to claim authorship of the work and to restrain or claim damages in respect of any distortion, mutilation, modification or other acts in relation to the said work which is done before the expiry of the term of copyright if such distortion, mutilation, modification or other act would be prejudicial to his honour or reputation. Moral rights are available to the authors even after the economic rights are assigned. For performances, the Act entails rights of performers too. Legally, a copyright can be assignable. The owner of the copyright in an existing work or the prospective owner of the copyright in a future work may assign to any person the copyright either wholly or partially and either generally or subject to limitations and either for the whole term of the copyright of any part thereof.

The term of copyright in India is the lifetime of a creator and 60 years after his/her death. In the case of original literary, dramatic, musical and artistic works, the 60-year period is counted from the year following the death of the author. In the case of cinematograph films, sound recordings, photographs, posthumous publications, anonymous and pseudonymous publications, works of government and works of international organizations,

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<sup>14</sup> The Indian Copyright Act today is compliant with most international conventions and treaties in the field of copyrights. India is a member of the Berne Convention of 1886 (as modified at Paris in 1971), the Universal Copyright Convention of 1951 and the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement of 1995. Though India is not a member of the Rome Convention of 1961, the Copyright Act, 1957 is fully compliant with the Rome Convention provisions. Two new treaties, collectively termed as Internet Treaties, were negotiated in 1996 under the auspices of the World Intellectual Property Organization (WIPO). These treaties are called the 'WIPO Copyrights Treaty (WCT)' and the 'WIPO Performances and Phonograms Treaty (WPPT)'. These treaties were negotiated essentially to provide for protection of the rights of copyright holders, performers and producers of phonograms in the Internet and digital era. India is not a member of these treaties as yet. Further reference: <http://copyright.gov.in/>



the 60-year period is counted from the date of publication. The term of rights for performers is 25 years.

The permission of copyright owners is *not required* for use of the work in specified cases under the act. The Act has specified the instances where permission is not required viz., for the purpose of research or private study; for criticism or review; in act of reporting current events; or in connection with judicial proceedings. Performance by an amateur club or society if the performance is given to a non-paying audience or making the sound recordings of literary, dramatic or musical works under certain conditions are also permitted.

Administration of copyright can be taken in collective manner. Very often, the management and protection of copyright in works are undertaken by a society of owners of such works. Since these societies, have basic organizational facilities and strength, they are able to keep a constant vigil over the uses of the work and are able to monitor the collection of royalty for such use. Since India is a member in international conventions, these societies can have reciprocal arrangements with similar societies in other countries and can collect royalty from any use of such work. It is in the interest of copyright owners to join a collective administration/organization to ensure better protection to the copyright in their works and for reaping optimum economic benefits from their creations.

Copyright of works of the countries of nationals of countries who are members of the Berne Convention for the Protection of Literary and Artistic Works, Universal Copyright Convention and TRIPS Agreement are protected in India through the International Copyright Order. The same is extended to Indian nationals in those countries.

In India, acquisition of copyrights is automatic and it does not require any formality. However, the certificate of registration of copyright and the entries made therein serve as *prima facie* evidence in a court of law with reference to disputes relating to ownership of copyright. Hence, in case of any infringement/disputes<sup>15</sup> *it is essential to register*.

A copyright owner can take legal action against any person who infringes the copyright in the work. The copyright owner is entitled to remedies by way of injunctions, damages and accounts. Copyright infringement is a criminal offence. Any person who knowingly infringes or abets the infringement of the copyright in any work commits a criminal offence under Section 63 of the Copyright Act. The minimum punishment for infringement of copyright is imprisonment for six months with a minimum fine of Rs 50,000/-. In the case of a second and subsequent conviction, the minimum punishment is imprisonment for one year and a fine of rupees one lakh.

As per the Indian Act, infringement is a cognizable offence<sup>16</sup>. Any police officer, not below the rank of a sub-inspector, may, if he is satisfied that an offence in respect of the infringement of copyright in any work has been, is being, or is likely to be committed, can seize without warrant, all the copies of the work and all plates used for the purpose of making infringing copies of the work, wherever found. All copies and plates so seized shall, as soon as practicable, are to be produced before a magistrate. The National Copyright Office<sup>17</sup> was established under the provision of the Copyright Act, 1957<sup>18</sup>. The office provides registration

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<sup>15</sup> Making infringing copies for sale or hire or selling or letting them for hire; permitting any place for the performance of works in public where such performance constitutes infringement of copyright; distributing infringing copies for the purpose of trade or to such an extent so as to affect prejudicially the interests of the owner of copyright; public exhibition of infringing copies by way of trade and import of infringing copies into India.

<sup>16</sup> Section 12 of the Copyright Act also lays down the powers of the Copyright Board and deems it to be a civil court for the purposes of Sections 345 and 346 of the Code of Criminal Procedure, 1973 and also that all the proceedings of the Board would be deemed to be judicial proceedings within the meaning of Sections 193 and 228 of the Indian Penal Code

<sup>17</sup> Section 11 of the Copyright Act requires the Central Government to constitute a Copyright Board headed by a Chairman with not less than two and not more than 14 other members. Registrar of Copyrights is to be Secretary of the Copyright Board

<sup>18</sup> The Section 9 of the Copyright Act requires for establishment of an office to be called the Copyright Office for the purpose of the Act. The Copyright Office is to be under the immediate control of a

facilities for all types of works indicated in the Act and is headed by a Registrar of Copyrights<sup>19</sup>.

### 3.3.2 Industrial Design

This is one of the categories of IP where the design system focuses on the aesthetic feature of an article derived from its visual appearance. A design refers to the features of shape, configuration, pattern, ornament or composition of lines or colors, applied to any article, in two or three-dimensional (or both) forms. The IP does not include any mode or principle of construction or anything, which is mere mechanical device. It also does not include any trade mark or any artistic work. Any person or the legal representation or the assignee can apply separately or jointly for the registration of a design. The term "person" also includes firm, partnership and a body corporate besides individuals. In India, the governance and administration of this IP is through the Designs Act, 2000. The International Classification of Industrial Designs as per the Locarno Agreement has also been introduced into Design Rules, 2001 under the Indian legislation conform to international trends in design administration. Essential requirement for registration is that the design should be new or original, distinguishable from known design/ a combination of known designs and be applied to an article and should appeal to the eye. A design should not comprise or contain scandalous obscene matter or not be disclosed to the public anywhere by publication in tangible form or by use or in any other way prior to the filing date<sup>20</sup>. The registration of a design confers upon the registered proprietor the exclusive right to apply a design to the article in the class in which the design has been registered. A registered proprietor of the design is entitled to legal protection of his intellectual property. Registration initially confers this right for ten years from the date of registration and is renewable for a further period of five years. However, if the fee for extension is not paid for the further period of registration within the period of initial registration, this right will cease. There is provision for the restoration is filed within one year from the date of cessation in the prescribed manner. Registration of the design is done only after undertaking a substantive examination is carried out where the novelty and/or originality are checked before the acceptance of the application (Fig. 1). Once the design is registered, it is entered into the design register and notified and published in official gazette and a design registration certificate is issued<sup>21</sup>.

### 3.3.3 Patent

A patent is a legal grant in respect of any invention in goods giving exclusive right for a limited period of time granted by the Government to the patentee, subject to his full disclosure of the invention. It is one of most popular and a strong form of IP, which focuses on an invention, which is any new and useful art, process, method or manner of manufacture, machine, apparatus or other article, and any substance produced by manufacture. An invention also includes any new and useful improvement in any of them. In India, the governance and administration of this IP is presently through The Patents Act, 1970 (39 of 1970) and the subsequent amendments made to it in a phased manner in 1999, 2002 and 2005, [The Patents (Amendment) Act 1999 (17 of 1999; The Patents (Amendment) Act 2002 (38 of 2002) The Patents (Amendment) Act 2005 (15 of 2005)] and their Rules to comply with the obligations by India to TRIPS agreement<sup>22</sup>.

An invention must have certain essential characteristics to be suitable for grant of a patent. These include novelty, non-obviousness and capability of industrial application.

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Registrar of Copyrights to be appointed by the Central Government, who would act under the superintendence and directions of the Central Government.

<sup>19</sup> Registrar of Copyrights; New Delhi, India

<sup>20</sup> Some items not considered for registration under this Act include: Book jackets, calendars, certificates, forms, dressmaking patterns, greeting cards, leaflets, maps and plans cards, post cards, stamps, transfers, medals; labels, tokens, cards, cartoons; any principle or mode of construction of any article Buildings and structures; parts of articles not manufactured and sold separately; mere mechanical contrivance or workshop alterations of components of an assembly; mere change in size of article; flags, emblems or signs of any country .

<sup>21</sup> At: <http://www.ipindia.nic.in>

<sup>22</sup> <http://www.patentoffice.nic.in/ipr/patent/patents.htm>.

Provision for grant of utility patents under the Indian Act is not there. Further, The Patent Act, 1970 and subsequent amendments in 2002 and 2005 specify some areas<sup>23</sup> that are not allowed for patenting even after meeting the essential requirements of a patent. Application for patents can be made by any person claiming to be the true and first inventor of the invention or by his assignee or legal representative<sup>24</sup>. An application for patent can be made by any of these persons either alone or jointly with any other person. Two or more companies as assignees may also make an application jointly. An application for the patent has to be filed in the respective patent office where the territorial jurisdiction. This application is a techno-legal document, which fully and particularly describes the invention and the best method of performing it. Immediately on receiving the application, the patent office accords an application number to it, and starts the procedure for examination. The procedure comprises of several stages including examination for patentability, opposition, scope for hearing for or against opposition, etc. The grant of a patent confers upon the patentee the exclusive right to it and entitlement of a legal protection to his intellectual property. This right is for period of 20 years from the date of application and has to be maintained for same period by payment of maintenance fees. However, if the fee is not paid this right will cease. And the invention will be in public domain. Granting of patent is done only after undertaking a substantive examination process where the patentability is checked before the acceptance of the application. Once the patent is accepted it is entered into the register and sealed through notification in official gazette and a patent grant certificate is issued. For inventions based or using biological materials, there are specific requirements as per Section 10 of the Act, which are mandatory to be followed before the application is made to the Patent Office<sup>25</sup>. Some of the special provisions provided towards instruments of patentability relating to inventions based on biological resources or traditional knowledge under the Indian Patent Act (amended), 2005 are tabulated in Table 3.3.

**Table 3.3. Provisions relating to Traditional Knowledge, Genetic Resources and Benefit Sharing under Patents (Amendment) Act, 2005**

Provisions
<p>Not patentable inventions include</p> <ul style="list-style-type: none"> <li>▪ ‘an invention which in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components’ [Sec. 3(p)]</li> <li>▪ If the patent application mentions a biological material, the applicant is required to ‘disclose the source and geographical origin of the biological material in the specification, when used in the invention’ [Sec. 10(4)(d)(D)]</li> <li>▪ Grant of a patent may be opposed or revoked, among others, on the following grounds: <ul style="list-style-type: none"> <li>○ ‘that the complete specification does not disclose or wrongly mentions the source or origin of biological material used for the invention [Sec. 25(j) and 64(p)]</li> <li>○ ‘that the invention so far as claimed in any claim of the complete specification is <ul style="list-style-type: none"> <li>○ anticipated having regard to the knowledge, oral or otherwise, available within any local or indigenous community in India or elsewhere (Sec. 25(k) and</li> </ul> </li> </ul> </li> </ul>

<sup>23</sup> Chapter II; Section 3 (a) to (p) of Indian Patent Act, 1970 define the inventions not patentable. Section 4 and 5 define inventions relating to atomic energy not patentable and inventions where only methods or processes of manufacture patentable.

<sup>24</sup> Section 6, Indian Patent Act, 1970.

<sup>25</sup> Requirement for biological materials (in Section 10 of the IPA, 1970; The specification to be accompanied by an abstract to provide technical information on the invention; The deposit of the material shall be made not later than the date of the patent application in India; All the available characteristics of the material required for it to be correctly identified or indicated are included in the specification along with name, address of the depository institution and the date and number of the deposit of the material at the institution (as per the Budapest Treaty of which India is a signatory). Access to the material is available in the depository institution only after the date of the application for patent in India or if a priority is claimed after the date of the priority; applicants are to disclose source and geographical origin of the biological material in the specification, when used in an invention.

These provisions have been made with a premise to afford the legal space to several inventions based on rich heritage of the land.

The patent system in India is administered under the superintendence of the Controller General of Patents, Designs, Trademarks and Geographical Indications<sup>26</sup>. The Office of the Controller General, functions under the Department of Industrial Policy and Promotion, Ministry of Commerce and Industry. Controller General's office is in Mumbai. There are four patent offices in India with the Head Office at Kolkata and other Patent Offices at Delhi, Mumbai and Chennai.

### 3.3.4 Geographical Indications (GI)

Geographical Indications of Goods<sup>27</sup> are defined as that aspect of industrial property which refers to the geographical indication referring to a country or to a place situated therein as being the country or place of origin of that product. Typically, such a name conveys an assurance of quality and distinctiveness which is essentially attributable to the fact of its origin in that defined geographical locality, region or country. It is essentially a sign used on goods with a specific geographical origin possessing qualities or a reputation stemming from that place of origin. Indications are which identify as goods originating in a territory, region or locality, where a given quality, reputation or other characteristic of the goods is essentially attributable to its geographical origin. It is a method of IP protection by a decree or by a register and can be a word or a mark. This protection gives right of exclusion to the owners in a competitive environment by preventing misuse by others. It also ensures quality and genuineness of products to the consumers and better market returns to the producers. Unlike other IPs, GI is a property owned by groups or community. It is recognition for products, which already exist with clear history and reputation and not created new. An association of persons or association of producers or any organization or Authority established by or under any law can register as owners of GI but not individuals. India, enacted the Geographical Indications of Goods (Registration & Protection) Act, 1999 and is in force from 15th September 2003. The Act and the Rules provide for establishment of GI registry. As per the Act, "goods" means any agricultural, natural or manufactured goods or any goods of handicraft or of industry and includes food stuff; the "indication" includes any name, geographical or figurative representation or any combination of them conveying or suggesting the geographical origin of goods to which it applies. For these goods the owners or major stakeholders are the producer<sup>28</sup>, proprietor<sup>29</sup> and authorized user<sup>30</sup>. Goods are classified in the Fourth Schedule of the Rules. There are 34 classes identified in The Act<sup>31</sup>.

<sup>26</sup> The Office of the Controller General of Patents, Designs & Trade Marks (CGPDTM) is located at Mumbai. The Head Office of the Patent office is at Kolkata and its Branch offices are located at Chennai, New Delhi and Mumbai. The Offices of The Patent Information System (PIS) and National Institute of Intellectual Property Management (NIIPM) are at Nagpur. The Controller General supervises the working of the Patents Act, 1970, as amended, and also renders advice to the Government on matters relating to these subjects. At: <http://www.patentoffice.nic.in/>

<sup>27</sup> Under Articles 1 (2) and 10 of the Paris Convention for the Protection of Industrial Property, geographical indications are covered as an element of IPRs. They are also covered under Articles 22 to 24 of the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement, which was part of the Agreements concluding the Uruguay Round of GATT negotiations.

<sup>28</sup> Producer in relation to goods, means any person who If such goods are agricultural goods, produces the goods and includes the person who processes or packages such goods; If such goods are natural goods, exploits the goods; If such goods are handicraft or industrial goods, makes or manufactures the goods, and includes any person who trades or deals in such production, exploitation, making or manufacturing, as the case may be, of the goods

<sup>29</sup> Registered proprietor: Means any association of persons or of producers or any organization for the time being entered in the register as proprietor of the geographical indication

<sup>30</sup> Authorized user: Means the authorized user of a registered geographical indication

<sup>31</sup> For details refer :Fourth Schedule of GI Act,1999

### 3.3.5 Semiconductor Integrated Circuit (IC)

Semiconductor Integrated Circuit (IC) means a product having transistors or other circuitry elements, which are inseparably formed on a semiconductor material or an insulating material or inside the semiconductor material and designed to perform an electronic circuitry function. To give effect to Section 6 in Part II of TRIPS, relating to Layout-design (topographics) of integrated circuits as intellectual property (IP), the Indian Parliament passed in September 2000, the Semi Conductor Integrated Circuits Layout-Design Act, 2000. The Semiconductor Integrated Circuits Layout-Design (SICLD) Act, 2000 is the governing Act for 'Lay out Designs of Integrated Circuits' in India. It defines 'layout design' means a layout of transistors and other circuitry elements including lead wires connecting such elements.

The aim of the Act is to provide protection of Intellectual Property Right (IPR) in the area of Semiconductor Integrated Circuit Layout Designs and for matters connected therewith or incidental thereto. The Act and the Rules provide for establishment of semiconductor integrated circuits layout-design registry. The Semiconductor Integrated Circuits Layout-Design Registry (SICLDR) is the office where the applications on Layout-Designs of integrated circuits are filed for registration of created IP. This Registry has jurisdiction all over India.

The Department of Information Technology<sup>32</sup>, Ministry of Information Technology is the implementing agency. The Registrar is empowered to determine the originality of the design<sup>33</sup> based on the information available with the office as also through the mechanism of advertisement of the application for registration of the layout-design and or any input received by the registry. The registration of a layout-design<sup>34</sup> shall be for a period of ten years from the date of filing an application for registration or from the date of first commercial exploitation anywhere in India or in any country, whichever is earlier.

### 3.3.6 Trade Mark

It is an IP in form of a visual symbol and is often more popular as brand name. This may be a word signature, name, device, label, numerals or combination of colours on goods or services or other articles of commerce and which help to distinguish it from other similar goods or services originating from a different source. Thus this mark guarantees the identity of the origin of goods and services can stimulate further purchase by the purchasers. It identifies the actual physical origin of goods and services. The brand itself is the seal of authenticity. In India, as a consequence to TRIPS, major changes have taken place in the Trade and Merchandise Marks Act, 1958. The Trade Marks Act, 1999 is now in force since 15th September 2003<sup>35</sup>. Through the amendments, the definition of trademark stands enlarged. It now includes shape of goods, packaging and combination of colours, which can be adopted as a trademark. The Act also provides for registration of trademark for services in addition to goods<sup>36</sup>. A single Register of trademarks with simplified procedures for registration has been provided. It also provides for registration of collective marks owned by association of persons.

All applications for registration of trade marks are received at the Head Office and its branches according to territorial jurisdiction. Applications are then examined mainly with regard to the distinctiveness, possibility of deceptiveness and conflicting trademarks. The

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<sup>32</sup> <http://india.gov.in/outerwin.htm?id=http://www.mit.gov.in/>

<sup>33</sup> A layout-design is prohibited from registration if: It is not original or it has been commercially exploited in India or in a convention country or is not inherently distinctive or those that are not capable of being distinguishable from any other registered layout-design

<sup>34</sup> Semiconductor Integrated Circuits Layout-Design Registry, New Delhi.

<sup>35</sup> The Trade Marks Registry was established in India in 1940 and presently it administers the Trade Marks Act, 1999 and the rules there under. It acts as a resource and information centre and is a facilitator in matters relating to trade marks in the country.

<sup>36</sup> The objective of the Trade Marks Act, 1999 is to register trade marks applied for in the country and to provide for better protection of trade mark for goods and services and also to prevent fraudulent use of the mark. The main function of the Registry is to register trade marks which qualify for registration under the Act and Rules.

registrar on consideration of the application and any evidence of use or distinctiveness decides whether the application should be accepted for registration or not. If accepted, it is published in official gazette i.e Trade Marks Journal for opposition. Within a prescribed period any person can file an opposition following which hearing takes place. If it is dismissed, the trademark is entered in the Register and certificate issued. The registrar's decision can be put to appeal to the Intellectual Property Appellate Board. The Registry has its Head Office at Mumbai with four regional offices in other jurisdictions.

### 3.3.7 Protection of Plant Varieties

Plant variety rights are a form of intellectual property protection granted to breeders of new varieties of plants. In a very general sense, a plant variety is a strain of a plant (or, more often, a crop) that is a pure breed. In other words, for a plant variety to be protected, it must produce the same type of plant in every generation, and should be distinct in appearance and distinguishable from others. Plant variety rights include, *inter alia*, royalty rights over a certain identified time period and restrictions on the propagation and subsequent use of seeds derived from such varieties. The protection of plant varieties around the world is guided by Article 27(3)(b) of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)<sup>37</sup>. The Article mandates states to protect plant varieties, while allowing them the flexibility to choose between a pure patent system, a unique protection system of its own kind, (*sui generis*), or a combination of the two. Given the TRIPS requirement and since the existing Indian Patent Act, 1970 excluded agriculture and horticultural methods of production from patentability; the Government of India has adopted the *sui generis* system for the protection of plant varieties. India designed a *sui generis* legislation<sup>38</sup>.

The *sui generis* PPV&FR Act of India has the convergence of provisions made under the TRIPS Agreement, the Convention for the Protection of New Varieties of Plants (UPOV<sup>39</sup>), The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and the traditional/conventional privileges and rights already available to Indian farmers and farming communities in the civil society. However, this Act also has substantial deviation from the UPOV Acts of 1978 and 1991 and, hence, it could not serve, so far, as a relevant instrument of India's accession to the UPOV Convention<sup>40</sup>. The ITPGRFA entered into force in 2004 is a comprehensive treaty whose objectives are the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA) and the fair and equitable sharing of benefits derived from their use, in harmony with the CBD, for sustainable agriculture and food security. The core of the Treaty is a 'multilateral system for access and benefit-sharing' which for certain categories of PGRFA guarantees facilitated access in return for benefit-

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<sup>37</sup> This sub-clause contains three conditions binding on sovereign states. States: *may* exclude from patentability plants, animals and essentially biological processes for the production of plants and animals; *must* allow patents for micro-organisms and non-biological and microbiological processes for the production of plants or animals; *must* provide protection for plant varieties, either by patents or by an effective *sui generis* [of its own kind] system or a combination.

<sup>38</sup> The process of drafting the PPVFR took more than 10 years. Starting in late 1980's, the first draft was produced by 1993 by Ministry of Agriculture, nodal Ministry throughout the development of the Bill. Based on the UPOV model, the penultimate draft was introduced in Lok Sabha (Lower House of Parliament) on December 12, 1999, and later was referred to 30-member Joint Parliamentary Committee (JPC) of both the Houses, for redrafting the Bill. This was which was due to inadequate provisions to protect the interests of the farmers, registration of extant varieties and tribunals for speedy settlement of disputes etc. The JPC redrafted the Bill, thus incorporating a chapter on farmer's rights, as per the IU, which is a unique feature. The original Bill authorized only the High Court to hear appeal against order of decisions of the authority or register. The new Bill recommended constitution of Tribunal for the purpose. Government of India 2001. The Protection of plant varieties and Farmers' Rights Act 2001. Act No.52 of 2001 New Delhi: Akalank Publications.

<sup>39</sup> Union for the Protection of New Varieties of Plants, commonly known as UPOV (based on its initials in French - *Union Internationale pour la protection des obtentions végétales*)

<sup>40</sup> Considerable debate has been generated on issue of India joining the UPOV. For India, protecting farmers' rights may be a contentious issue when it decides to join UPOV. Article 37(3) of the UPOV 1991 convention clearly states that after December 31, 1995, all countries which wish to join UPOV must accede to the 1991 convention. <http://www.agbioindia.org/archive.asp>

sharing. However, in respect of traditional knowledge, the key provision of the Treaty is its recognition of 'farmers' rights'<sup>41</sup>.

Thus the plant variety protection in India is governed by the 'The Protection of Plant Varieties and Farmers' Rights Act, 2001' (PPV& FR Act) (53 of 2001). The PPV&FR Rules 2003 were published in the Gazette on September 12, 2003 and provide the manner and procedures for registration of Plant Varieties. The Act covers all categories of plants, except microorganisms<sup>42</sup>.

There are two unique provisions of the *sui generis* legislation developed for the first time by India. These are: (i) protection of extant varieties, which include previously notified varieties under the seed law and other varieties of common knowledge/public domain, and (ii) farmers' rights<sup>43</sup>, which are quite elaborate and recognize the farmers as conservers and providers of genetic resources, breeders of farmers/new varieties, and users/cultivators of the varieties protected under the law, having the right to use their farm-saved seed in a variety of ways, except as branded seed. Further, to affirm such privileges and rights to farmers<sup>44</sup> as the availability of farm saved seed for further propagation, sharing, exchanging or even selling except for as branded seed, the Indian legislature has imposed a ban on the grant of exclusive right over such new plant varieties under this Act as may carry the genetic use restriction technology (GURT)<sup>45</sup>.

Apart from the breeders and others involved in developing new varieties, the Act recognizes *farmers* too. A farmer who has bred or developed a new variety shall be entitled for registration and other protection under PPV&FR Act, 2001 in the same manner as a breeder of a variety. Similarly, a farmer who is engaged in the conservation of genetic resources of land races and wild relatives of economic plants and their improvement through selection and preservation shall be entitled in the prescribed manner for recognition and reward from the Gene Fund provided that material so selected and preserved has been used as donors of genes in varieties registered under this Act. Farmer shall be entitled to save, use, sow, re-sow, exchange and share or sell his farm produce including seed of a variety protected under this act in the same manner as he was entitled before the coming into force of this Act provided that the farmer shall not be entitled to sell branded seed of a variety protected under this Act<sup>46</sup>. While plant variety present in wilderness cannot be registered, under PPV&FR Authority, any traditionally cultivated plant variety, which has undergone the process of domestication/improvement through human interventions, can be registered and

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<sup>41</sup> The International Treaty on Plant Genetic Resources for Food and Agriculture is aimed to fight against hunger and poverty and essential for the achievement of Millennium Development Goals 1 and 7. No country is self-sufficient in plant genetic resources; all depend on genetic diversity in crops from other countries and regions. International cooperation and open exchange of genetic resources are therefore essential for food security. The fair sharing of benefits arising from the use of these resources has for the first time been practically implemented at the international level through the Treaty and its Standard Material Transfer Agreement. The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) At: <http://www.planttreaty.org/>

<sup>42</sup> Cullet, Phillippe and Radhika Koduru. 2003. Plant Variety Protection and Farmers Rights. Towards a broader understanding. 24 Delhi Law Review 2002(2003). Pages 41 –54. Also available at <http://www.ielrc.org/content/a0304.pdf>.

<sup>43</sup> "This is the first time anywhere in the world the rights of farmers and breeders are given concurrent recognition." Quoted from: Swaminathan. M.S. 2001. September 15, 2001 "Down to Earth" Pages 48 to 50.

<sup>44</sup> Section 2(k) "farmer" means any person who cultivates crops by cultivating the land himself; or cultivates crops by directly supervising the cultivation of land through any other person; or conserves and preserves, severally or jointly'. With any person any wild species or traditional varieties, or adds value to such wild species or traditional varieties through selection and identification of their useful properties.

<sup>45</sup> Kochhar, Sudhir. 2008. Institutions and capacity building for the evolution of IPR regime in India: Protection of Plant Varieties and Farmers, Rights. Journal of Intellectual Property Rights. Vol.13, January 2008, pp 51-56.

<sup>46</sup> PPV&FR Act, 2001. Chapter VI. [Section 39 (1), (i) – iv]

protected subjected to fulfillment of the eligible criteria<sup>47</sup>. The duration of protection of registered varieties varies for different crops considering their nature<sup>48</sup>.

The Act has specified prerequisites for registration of a plant variety<sup>49</sup>. These include denomination assigned to such variety with an affidavit that variety does not contain any gene of gene sequences involving terminator technology to be attached. It is required that complete passport data of parental lines (geographical location in India; all information relating to the contribution if any, of any farmer (s), village, community institution or organization in breeding, evolving or developing the variety along with characteristics of variety with description for Novelty, Distinctiveness, Uniformity and Stability (NDUS). In addition the person<sup>50</sup> making application for registration shall disclose the use of genetic material conserved by any tribal or rural families for improvement of such variety<sup>51</sup>. In addition, the breeder shall be required to deposit the seed or propagating material including parental line seeds of registered variety to the Authority. An applicant has to submit a fixed amount of seed sample (breeder seed) with the seed quality test report. The seed samples received by the Authority will be properly tested for its purity and germination. A part of the seed sample will be sent to the test center for conduct of Distinctiveness, Uniformity and Stability (DUS) tests and a part of it will be kept by the Authority in the National Gene Bank to maintain the seed samples of the registered varieties for their entire period of protection. Any person seeking for the seed sample of a protected variety or a variety undergoing the DUS test procedure has to get permission from the Authority or the concerned breeder of the variety. Table 3.3 shows a tabulation of various provisions afforded towards protection of traditional knowledge base, genetic resources and on the issues of benefit sharing.

**Table 3.4. Provisions relating to Traditional Knowledge, Genetic Resources and Benefit Sharing under Protection of Plant Variety and Farmers' Right Act, 2001**

<b>Provisions</b>
'benefit sharing, in relation to a variety, means such proportion of the benefit accruing to a breeder of such variety or such proportion of the benefit accruing to the breeder from an agent or a licensee of such variety, as the case may be, for which a claimant shall be entitled as determined by the Authority under Section 26 [Sec. 2(b)];
Every application for registration ...shall
<ul style="list-style-type: none"> <li>▪ contain a complete passport data of the parental lines from which the variety has been derived along with the geographical location in India from where the genetic material has been taken and all such information relating to the contribution, if any, of any farmer, village community, institution or organization in breeding, evolving or developing the variety' [Section 18(e)];</li> <li>▪ 'contain a declaration that the genetic material or parental material acquired for breeding, evolving or developing the variety has been lawfully acquired' [Section 18(h)];</li> <li>▪</li> </ul>

<sup>47</sup> As defined by Indian law, "variety" broadly means "a plant grouping except micro organism within a single botanical taxon of the lowest known rank, which can be... considered as a unit with regard to its suitability for being propagated, [and] which remains unchanged after such propagation, and includes propagating material of such variety, extant variety, transgenic variety, farmers' variety and essentially derived variety", Section 2(za), PVP Act.

<sup>48</sup> Duration of protection for trees and vines-18 years For other crops -15 years For extant varieties-15 years from the date of notification of that variety by the Central Government under Section 5 of the Seeds Act, 1966. [vide Section 24 of the Act].

<sup>49</sup> Vide Section 15 of PPV&FR Act, 2001.

<sup>50</sup> Persons/Institutions eligible to apply are: Any person claiming to be the breeder of the variety; Any successor of the breeder of the variety; Any person being the assignee or the breeder of the variety in respect of the right to make such application; Any farmer or group of farmers or community of farmers claiming to be breeder of the variety.

<sup>51</sup> Form I – for registration of new variety, extant variety and farmer's variety and Form II – for essentially derived varieties (EDVs) and transgenic varieties Technical Questionnaire covering detailed information of the concerned variety. Along attached with the forms (I and II) – for Prescribed fee



On receipt of copy of the certificate of registration...the Authority shall publish such contents of the certificate and invite claims of benefit sharing to the variety registered under such certificate in the manner as may be prescribed [Section 26(1)](2)

On invitation of the claims under sub-section (1),

- any person or group of persons or firm or governmental or nongovernmental organization shall submit its claim of benefit sharing to such variety in the prescribed form within such period, and accompanies with such fees, as may be prescribed [Section 26(2)]:
- the extent and nature of the use of genetic material of the claimant in the development of the variety relating to which the benefit sharing has been claimed.
- the commercial utility and demand in the market of the variety relating to which the benefit sharing has been claimed.
- The amount of benefit sharing to a variety determined under this section shall be deposited by the breeder of such variety in the manner referred to in clause (a) of sub-section 45 in the National Gene Fund.
- the amount of benefit sharing determined under this section shall, on a reference made by the Authority in the prescribed manner, be recoverable as an arrear of land revenue by the District Magistrate within whose local limits of jurisdiction the breeder liable for such benefit sharing resides.

During the period between filing of application for registration and decision taken by Authority on application, the right holder shall enjoy provisional protection of his variety against any abusive act committed by any third party. In case of any act of such abuse the right holder may bring it to the notice of Registrar PPV&FR who is entrusted with the powers to issue directions in such cases as per Section 24(5) of the Act, and also powers of a Civil Court to protect the interests of a breeder.

As a result of grant of Plant Variety Protection (PVP) certificate, a title holder of a registered variety can exclusively use the variety on his own or through agents/licensees/inheritors/successors/assignees for the entire term of its protection, excluding others from unauthorized protection, sales, marketing, distribution, import or export of propagation material of the protected variety. Whereas, the registrar and the PPV&FR Authority shall administer the grant, maintenance, revocation, and cancellation of breeder's right or any correction of entry in the register, if applicable, or the registration of agents/licensees of breeder for a particular registered variety, in terms of the restriction of breeders' right, the PPV&FR Authority invites any claims for benefit sharing by publishing the particulars of the registered variety in Plant Variety Journal of India, gives opportunity to breeder to be heard, and decides on benefit sharing. The PPV&FR Authority is also allowed to admit cases, hear and decide on grant of compulsory license, if any, setting the term and conditions and limitations of compulsory license, and grant and quantum of remuneration to the breeder for the compulsory license. In case a breeder is aggrieved with any order or decision of the Authority or Registrar that affects his entitlement rights, he may make an appeal before the PVP Appellate Tribunal. Such appeals will be admitted and disposed of in respect of the following matters; (i) registration of varieties, (ii) registration of agents/licensees, (iii) revocation or modification of compulsory license, and (iv) payment of compensation made under the law. Further, if a breeder notices an infringement of his entitlement right, he may approach any Court (but not inferior to a District Court) in whose jurisdiction any act of alleged infringement occurs<sup>52</sup>. The Act has provisions for the registration of agents and licensees, and has also accorded rights to them<sup>53</sup>. Further, unless validity of registration is challenged, certificate issued by Registrar shall be the conclusive proof of entitlement of agents/licensees along with conditions/restrictions, if any as per Section 28(5) of the Act. The Act also provides that the registered agent/licensee not entitled

<sup>52</sup> District Courts will admit such cases of alleged infringement under Section 65.

<sup>53</sup> For example, to prevent infringement of Breeder's Right, a registered agent may institute legal proceedings in his own name as per Section 28 (6) of the Act. However, he may have to do so only after giving information of infringement and 3 months' time to the title holder to take proceedings to prevent it. In such proceedings, the breeder shall be added as defendant. He shall not be liable for any costs unless he enters an appearance and takes part in the proceedings as per Section 28 (7) of the Act.

to transfer the right any further as per Section 28(8) of the Act. The implementation of PPV&FR Act revolves round the core institutional mechanism provided by the PPV&FR Authority and the PPV&FR Registry, various enforcement provisions made in the Act, and also the provision for speedy legal remedies and recourse by the PVP Appellate Tribunal (Fig. 1).

**Fig. 1. Administration and Enforcement Structure of PPV&FRA**

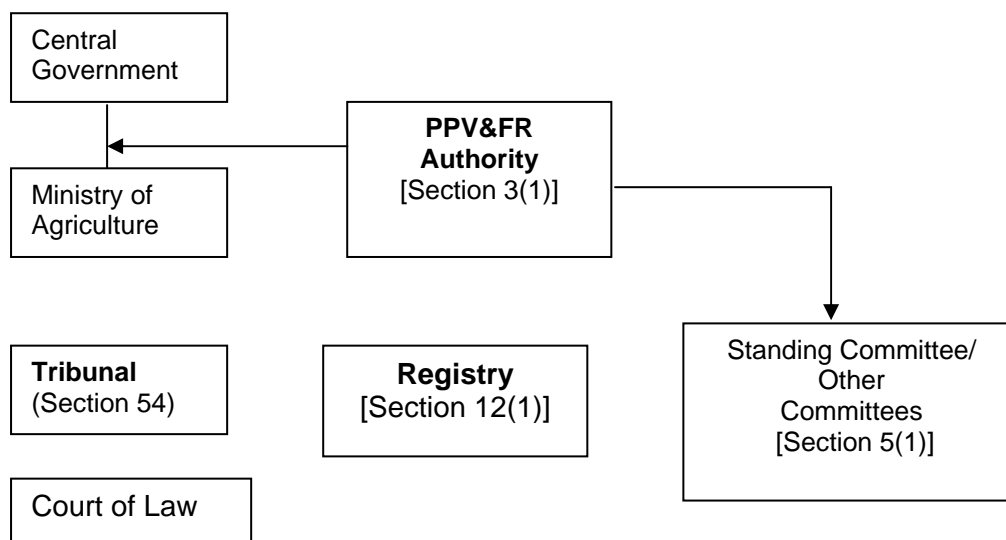


Fig Source: Adapted from Trivedi, 2006<sup>54</sup> and Kochhar, 2008<sup>55</sup>.

At present, the Act also provides that the existing Appellate Tribunal under the Trade Marks Act, 1999 would hold for the purpose of PPV&FR Act till the regular Appellate Tribunal is appointed separately. The PPV & FR Authority and Registrar has the powers of a Civil Court<sup>56</sup>. Further, all appeals for the orders/decision of Authority/Registrar will be made to the PVP Appellate Tribunal<sup>57</sup>. The Act provides that suits for the infringement of the breeder's rights shall be filed as per Section 65 of the Act in a District Court, or a Superior Court, within the local limits of whose jurisdiction any act of infringement of breeder's right is committed. This provision is clearly aimed at avoiding delay in the settlement of IPR related disputes, which is otherwise possible in lower courts due to long queues of pending cases.

The PPV&FR Authority was created under the aegis of this Act, as the implementing Authority in this legislation, with central operations in Delhi<sup>58</sup>. The genera and species of the varieties for protection are notified through a Gazette notification. In May 2007, twelve species

<sup>54</sup> Trivedi,RK.2006. Lecture in training program for agriculture officers of AP at NAARM, Hyderabad, during November 2006.

<sup>55</sup> Kochhar, Sudhir 2008. Institutions and capacity building for the evolution of intellectual property rights regime in India:-conformity and enforcement issues. Protection of Plant Varieties and Farmers Rights. Journal of Intellectual Property Rights.Vol. 13, May 2008,pp.239-244.

<sup>56</sup> Vide Section 11(a) of the Act and the orders passed by them are executable as a decree of a Civil Court as per Section 11(b) of the Act in all proceedings for the purposes of receiving evidence, administering oaths, enforcing the attendance of witnesses, compelling the discovery and production of documents, issuing commissions for the examination of witnesses, etc

<sup>57</sup> vide Section 56 of the Act for the purposes of registration of variety, registration of agent/licensee, claim for benefit sharing, revocation/modification of compulsory license, and payment of compensation made as per Section 54 of the Act.

<sup>58</sup> Protection of Plant Varieties and Farmers' Rights Authority has been established and is located at NASC Complex, DPS Marg, Opp- Todapur, New Delhi-110 012.

of crops<sup>59</sup> were opened up for applications. Till Dec 1, 2008, about 970 applications had been received, of which 550 relate to extant varieties, 5 are for farmers' varieties, while the remainder are for new varieties<sup>60</sup>.

Though the number of applications is fairly large, it is important to note that not all of them are not in acceptable format. For example, there are applications which are not accompanied by seed, which is required by law in some categories, which have been automatically treated as 'dropouts'.

The largest number of applications have been for 'extant varieties', which under the Act, may be of four types, those varieties that are already notified under the Seed Act, 1966; Farmers' Variety (FV)<sup>61</sup> 'Variety of Common Knowledge', which are protected under the PPV&FR Act; or any other variety which is in the public domain. More than half of the applications (about 550) for registration received were of the extant variety category. Of these, the Extant Variety Recommendations Committee formed within the Authority has cleared almost half the cases for final approval. The Authority also publishes the monthly Plant Variety Journal<sup>62</sup> of India which serves as the Gazette for this Act. Twelve issues of the Plant Variety Journal of India, a priced publication of the PPV&FR Authority, have been already brought out until December 2008<sup>63</sup> to disseminate public knowledge related to the PPV&FR Act, and also to publish information on the status of the applications.

The Authority is also contributing in developing capacity of trained manpower and for enhancing institutional capacity for the implementation of the plant variety protection and the farmers' rights provided in the Act, the PPV&FR Authority has made collaborative arrangements with ICAR institutes like Indian Agricultural Research Institute (IARI)<sup>64</sup> to impart training for developing skills in the professionally qualified (PQ) persons, scientific manpower, farmers, NGOs, extension workers, and other public and private agencies. These trainings are organized for different durations, ranging from 3-5 days to 10 weeks. It also sponsors training in other institutes<sup>65</sup> and state agricultural universities for all engaged in this activity from public and private sector.

### **3.3.9 Space relating to Traditional Knowledge, Genetic Resources and Benefit Sharing in the other Laws**

In tune with societal needs in a country with rich traditional base, following the instances of alleged bio-piracy on issues related to biological resources in recent past, policy and lawmakers in India have provided various provisions in Indian Laws. This is done with a premise to develop instruments to enhance the profits to the concerned stakeholders on one hand and also to preserve the rights of people engaged in knowledge spheres of traditionally held domains in the society. The Biological Diversity Act, 2002 enacted in 2002 enables a statutory authority, National Biodiversity Authority (NBA), which oversees the

<sup>59</sup> DUS test guidelines finalized for 14 notified crop species: Black gram, Bread wheat, Chickpea, Field pea, Green gram, Kidney bean, Lentil, Maize, Pearl millet, Pigeon pea, Rice, Sorghum, Cotton, Jute. vide Section 29(2) of the Act At: <http://www.plantauthority.gov.in/index.htm>

<sup>60</sup> Sumathi Chandeseckhran. 2008. At: <http://spicyipindia.blogspot.com/2008/12/spicyip-interview-plant-variety.html>

<sup>61</sup> The definition of 'farmers' variety' is contentious and still in process. According to the Chairperson PPVFRA, "there lies here a potential project for institutions to document FVs, especially rice, which is an Indian variety and under threat from MNCs".

<sup>62</sup> Soft copies of the journal are also available on the official website of the Authority. At: <http://www.plantauthority.gov.in/publications.htm>

<sup>63</sup> For instance, the ACCEPTED APPLICATION FOR REGISTRATION of an application is now in the latest issue of journal. In: Plant Variety Journal of India, Vol. 2, No.12. December 01, 2008/ At: [http://www.plantauthority.gov.in/PDFFile/PVJ\\_dec\\_2008.pdf](http://www.plantauthority.gov.in/PDFFile/PVJ_dec_2008.pdf)

<sup>64</sup> Premier agricultural research institute in India and a deemed-to-be-university for human resource development

<sup>65</sup> NAARM has been partnering with Farm and Rural Science Foundation (FRSF), a non-profit organization for conducting training programs sponsored by the Authority during last two years, 2006-08.

activities defined. Table 3.5 lists some of the provisions under law to use of biological resources and IPRs resulting from using them.

**Table 3.5. Provisions relating to Traditional Knowledge, Genetic Resources and Benefit Sharing under BD Act, 2002.**

<b>Provisions under BD Act, 2002</b>
<ul style="list-style-type: none"> <li>▪ The Act prohibits certain category of persons, especially foreigners, ‘without previous approval of the National Biodiversity Authority’ to, ‘obtain any biological resource occurring in India or knowledge associated thereto for research or for commercial utilization or for bio-survey and bio-utilization’ [Sec. 3(1)].</li> <li>▪ The Act prohibits the ‘transfer the results of any research relating to any biological resources occurring in, or obtained from, India for monetary consideration or otherwise’ to certain categories of persons, especially foreigners [Sec. 3(4)]</li> <li>▪ The Act prohibits the application ‘for any intellectual property right, by whatever name called, in or outside India for any invention based on any research or information on a biological resource obtained from India without obtaining the previous approval of the National Biodiversity Authority before making such application’ [Sec. 6(1)].</li> <li>▪ ‘The National Biodiversity Authority may, while granting the approval under this section, impose benefit sharing fee or royalty or both or impose conditions including the sharing of financial benefits arising out of the commercial utilization of such rights’ [Sec. 6(2)].               <ul style="list-style-type: none"> <li>○ ‘The National Biodiversity Authority shall while granting approvals under section 19 or section 20 ensure that the terms and conditions subject to which approval is granted secures equitable sharing of benefits arising out of the use of accessed biological resources, their by-products,</li> <li>○ innovations and practices associated with their use and applications and knowledge relating thereto in accordance with mutually agreed terms and conditions between the person applying</li> <li>○ for such approval, local bodies concerned and the benefit claimers.’ [Sec. 21 (1)].</li> </ul> </li> </ul> <p>The National Biodiversity Authority shall, subject to any regulations made in this behalf determine the benefit sharing which shall be given effect in all or any of the following manner namely (a) grant of joint ownership of intellectual property rights to the National Biodiversity Authority, or where benefit claimers are identified, to such benefit claimers; (b) transfer of technology; (c) location of production, research and development units in such areas which will facilitate better living standards to the benefit claimers; (d) association of Indian scientists, benefit claimers and the local people with research and development in biological resources and bio-survey and bio-utilization; (e) setting up of venture capital fund for aid to the cause of benefit claimers; (f) payment of monetary compensation and non-monetary benefits to the benefit claimers as the National Biodiversity Authority may deem fit.</p>

## 4. ICAR System

*"A policy is a temporary creed liable to be changed, but while it holds good it has got to be pursued with apostolic zeal." - Mahatma Gandhi*

### 4.1 The Indian Council of Agricultural Research (ICAR)

The Indian Council of Agricultural Research (ICAR) is an autonomous organisation under the Department of Agricultural Research and Education, Ministry of Agriculture, Government of India. Formerly known as Imperial Council of Agricultural Research, it was established on 16 July, 1929 as a registered society under the Societies Registration Act, 1860 in pursuance of the report of the Royal Commission on Agriculture. The ICAR<sup>66</sup> is the apex body for planning, promoting, coordinating and undertaking research, coordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country. It is also the nodal agency of the National Agricultural Research System (NARS) comprising Central and State Agricultural Universities, Central Universities and affiliated colleges of agriculture, and other organizations (includes public and private, national and international agencies) dealing with agricultural research.

The ICAR system consists of a network of institutions comprising 47 national institutes including 4 deemed to be universities and an academy of agricultural research management, 5 national bureaus, 12 project directorates, 31 national research centres, 91 All India Coordinated Research/Network Projects (AICRP) and 538 Farm Science Centres (*Krishi Vigyan Kendras or KVKs*). The AICRP programs are the main link between ICAR and State Agricultural Universities (SAUs). These were introduced to ensure complementarities in the research programmes of different institutions and provide a mechanism for joint evaluation of new technologies by the scientists through multi-location testing<sup>67</sup>. The number of centres under AICRPs is about 1300 of which 900 are based in universities and 200 in the ICAR institutes<sup>68</sup>.

### 4.2 Partners and Mode of Functioning

Several other partners support the research activities of ICAR. These include 23 general universities, under the University Grants Commission (UGC), several scientific organisations such as Council of Scientific and Industrial Research (CSIR), Bhabha Atomic Research Centre (BARC), National Remote Sensing Agency (NRSA), other governmental agencies, and more than 100 private and voluntary agencies and about 105 scientific societies. All these form a part of the National Agricultural Research System (NARS). The total number of scientists exceeds 20,000 making the Indian NARS is one of the largest systems in the world<sup>69</sup>. It is well contended that the effective functioning of this system, in close association with education and extension systems, has contributed to the rapid growth of agriculture after India became independent in 1947<sup>70</sup>. Research programs are centring basic as well as applied issues, and on diverse problems facing production of crops, animals, fisheries, etc., with the objective of evolving new production technologies suited to different agro-climatic conditions. Using formal and informal arrangements with these agencies, ICAR continues to<sup>71</sup>:

<sup>66</sup> Indian Council of Agricultural Research (ICAR), Krishi Bhawan, 1, Dr. Rajendra Prasad Road, New Delhi – 110 001; is a Registered Society, incorporated under the Societies Registration Act, 1860.

<sup>67</sup> Raman, K.V. and Balaguru, T. 1990. National Agricultural Research System in India. *Journal of Indian School of Political Economy* 2(3): 449-474.

<sup>68</sup> As quoted in Page 16. Source: ICAR Vision 2020. Vision Document 2020. 84 Pages.

<sup>69</sup> The research system includes approximately 30,000 scientists and more than 100,000 supporting staff actively engaged in research related to agriculture.

<sup>70</sup> Balaguru, T. and Raman, K.V. 1988. Agricultural Research System in India. In: *Agricultural Research Systems and Management in the 21st Century*, Raman, K.V. *et al.* (Eds), NAARM Alumni Association, Hyderabad

<sup>71</sup> Supra at n. 3 Source: ICAR Vision 2020. Vision Document 2020 DARE/ICAR Annual Report 2007-2008. <http://www.icar.org.in/anrep/200708/AR200708.htm>

- (i) implement research mandates extending beyond the administrative boundaries of the States;
- (ii) pursue basic research not undertaken by most Agricultural Universities
- (iii) evaluate research results through multi - location testing
- (iv) develop manpower for Agricultural Universities and other agricultural institutions.

This approach has helped it to play a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India. Research and technology development programs have enabled the country to increase the production of food grains by 4 times, horticultural crops by 6 times, fish by 9 times (marine 5 times and inland 17 times), milk 6 times and eggs 27 times since 1950-51, thus making a visible impact on the national food and nutritional security<sup>72</sup>.

### 4.3 New Role

With new changes in agriculture at the global levels, the ICAR is attempting to redefine its mission through the Vision plan<sup>73</sup>, and is embarking on developing profess in the use of cutting-edge technologies<sup>74</sup>. In conjunction with ongoing programs, it now aims to look into problems relating to broader areas of rural development concerning agriculture, including post-harvest technology, by developing co-operative programmes with other organizations at national and international levels<sup>75</sup>. The agriculture sector in India accounts for about 22% of its GDP, 15% of the total export earnings and employs about 56.7% of the country's workforce. It plays a key role in ensuring national food security, and in the process, national security as well. For these reasons, agricultural development has a *strong multiplier effect* across the economy. There is increasing consensus that, in a globalizing economy, a long-term economic growth agenda for India is feasible only if it has agricultural development that raises rural incomes as its central concern. Rising economic growth rates and investments, and expanding global trade create opportunities for agricultural growth that can raise rural incomes, reduce poverty and provide for food and nutritional security.

Making use of these opportunities requires a transition from the present producer-driven approach to agricultural development to a market-led agricultural development approach that enables producers to understand and respond appropriately to consumer needs and preferences. Piloting the agricultural transition, therefore, requires that special attention be given to reducing the vulnerability of the poor in the disadvantaged regions and ensuring their smooth integration into the economy. The National Policy on Agriculture (NPA), the Tenth Five Year Plan<sup>76</sup>, as well as the Eleventh Five Year Plan of the Government of India<sup>77</sup>, which is in force currently, all recognize the need for a market-led, but regionally-differentiated approach to agricultural development. The Policy and Plans also accord high priority to agricultural research for generation and transfer of agricultural technologies that

<sup>72</sup> <http://www.icar.org.in/ICARataglance.pdf>

<sup>73</sup> Source: ICAR Vision 2020. Vision Document 2020

<sup>74</sup> "Keeping this in view, our priority areas would be eco-region specific technology generation and extension in continuation; systems perspective in research and education; enhancement of water productivity and nutrient-use efficiency; climate change and management of stresses; landuse systems for multi-functional agriculture; diagnostics, vaccines and delivery systems; value added product development, food safety and quality assurance; biosensors, biofuels, biomolecules, biofortification, biosafety, biosecurity, bioremediation, and biofertilization; IT-based decision support systems for technology transfer; human resource development in niche areas; and enabling mechanisms for enhancing R&D productivity. This calls for significant new initiatives in research and development and enhanced investments for technology generation relevant to different regions/situations".- Dr Mangala .Rai, DG, ICAR. Quoted from : DARE/ICAR Annual Report At: 2007-2008 <http://www.icar.org.in/anrep/200708/AR200708.htm>

<sup>75</sup> Section 5 of the Indian Patent Act 1970 only inventions which are methods or processes of manufacture were patentable; restricted patents from substances in India for use or capable of being used as food or as medicine or drug ..... substances capable of being used as food/medicine/drugs were not allowed for patenting. This was prior to 1995.

<sup>76</sup> At: <http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html>

<sup>77</sup> Eleventh Five Year Plan.(2007–2012).Agriculture, Rural Development, Industry, Vol. III.Pages 537. At:

[http://planningcommission.nic.in/plans/planrel/fiveyr/11th/11\\_v3/11th\\_vol3.pdf](http://planningcommission.nic.in/plans/planrel/fiveyr/11th/11_v3/11th_vol3.pdf)

help to increase farm incomes and rural employment opportunities, as well as to ensuring sustainability of livelihoods in the less developed regions. Against this premise, the Govt of India has launched an innovative programme called the National Agricultural Innovation Project (NAIP) in 2006, with World Bank support, to bring about plurality of stakeholder involvement in agricultural R&D through consortia mode of operation<sup>78</sup>. This program is seen as the means to achieve the holistic approach to help India become more competitive in agriculture trade and also improve livelihoods of many in this sector.

Along with this it is realised that trade liberalization has shifted economic incentives and improved technologies are now critical factors in a country's ability to exploit its comparative and competitive advantages. Technological needs are changing toward more knowledge- and skill-intensive agriculture and more complex farming systems. Important changes in the technology for research itself, especially the new biotechnologies and informational technologies, are raising new issues in organizing national research systems, related to economies of size, international collaboration, and public-private linkages.

#### 4.4 Need for Institutionalization of IP Policy

Such paradigm shifts in agricultural systems though essential for broad vision of improving rural sectors are necessitating the reorientation of mechanisms and mode of agricultural research and innovation system all over the world including India. Historically, agricultural research was not concerned with IP issues (except to a limited extent for mechanical inventions) as living organisms (plants and animals) or the bioprocesses (like tissue culture), and inputs used to produce them like fertilizers, and pesticides were kept out of the purview of IP protection<sup>79</sup>. It was only after 1995, when the WTO agreement on Trade Related Intellectual Property Rights (TRIPS)<sup>80</sup> made it mandatory for all member nations to provide for protection of IP arising from agricultural research. The agreement expanded the level, scope, extent and role of IP protection tremendously and forced the developing countries into its ambit, leading to fundamental changes in the nature and ownership of innovations and resources in agriculture<sup>81</sup>.

The entry of new players and opening of markets in global arena has also brought new equations on owning of intellectual property and resultant difficulties in access for inputs in research. The role of intellectual property rights (IPRs) in international trade, the global economy and international relation has grown considerably, especially since the 1970s<sup>82</sup> (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 necessitate legal protection mechanisms to be in place.

A summary of legal provisions in IP laws in India was discussed in preceding chapter. ICAR is also bound by national laws and recognizes the evolving trends in IP jurisprudence

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<sup>78</sup> "The NAIP is to facilitate accelerated and sustainable transformation of Indian agriculture in support of poverty alleviation and income generation by collaborative development and application of agricultural innovation by the public research organizations in partnership with the farmer's groups, the private sector, the civil society organizations and other stakeholders". ICAR. 2006. National Agricultural Innovation Project. Project Implementation Unit, NAIP, New Delhi. Available at: <http://www.naip.icar.org.in/>

<sup>79</sup> Section 5 of the Indian Patent Act 1970 only inventions which are methods or processes of manufacture were patentable; restricted patents from substances in India for use or capable of being used as food or as medicine or drug substances capable of being used as food/medicine/drugs were not allowed for patenting. This was prior to 1995.

<sup>80</sup> Available at: [http://www.wto.org/english/tratop\\_e/TRIPS\\_e/TRIPS\\_e.htm#WhatAre](http://www.wto.org/english/tratop_e/TRIPS_e/TRIPS_e.htm#WhatAre)

<sup>81</sup> Juma, C.1999. Intellectual Property Rights and Globalization: Implications for Developing Countries. Science, Technology and Innovation Discussion Paper No.4, Center for International Development, Harvard University, Cambridge, MA, USA.

<sup>82</sup> Dutfield, Graham. 1999. Intellectual Property Rights, Trade and Biodiversity: The Case of Seeds and Plant Varieties. Background Paper written for IUCN Project on the Convention on Biological Diversity and the International Regime. Inter-sessional Meeting on the Operations of Convention. Montreal, Canada, 28-30 June 1999. Pages 1-97.



and in developing its IP policy; it has imbibed these obligations too<sup>83</sup>. For organizations like ICAR which is part of a large NARS, it becomes more obligatory to place an institutional mechanism in place. Institutionalizing intellectual property management requires an effective policy<sup>84</sup> to guide decisions and internal processes related to the management of various forms of IP at all levels of hierarchy within the organization. For public systems, policy is driven by a vision of society's future and guided by the basic principles of effectiveness, transparency, equity, consistency and comprehensiveness<sup>85</sup>. By this definition, a national agricultural policy<sup>86</sup> would include a set of principles, rules, guidelines or mechanisms to effectively plan and regulate production, processing and trade of agricultural products while providing for sustainable food security and rural employment to promote growth and equity.

Likewise, a policy on intellectual property (IP) in agricultural research in public research systems includes a set of principles, rules, guidelines or mechanisms to guide decisions on managing intellectual property to promote more effective research and technology transfer, in a manner that is consistent with the role and objectives of the organization. It is contended that an effective IP policy not only supports efficient decision-making, but also provides the basis for institutionalizing related organizational systems, mechanisms and procedures to ensure both efficiency and accountability of decisions at all levels of hierarchy within the organization. Hence, in adjusting to the external forces and changing the management of IPR, a national agricultural research organization (NARO) must take into account<sup>87</sup>, a policy framework guiding its mission, objectives and programs, with its stakeholders, and its research scientists. Since management of intellectual property (IP) attached to agricultural research is a relatively new phenomenon, developing, implementing and managing such a dynamic system can present formidable challenges and complications. In the recent past, several agriculture research institutions including the CGIAR system have responded to these demands and initiated institutionalization of IP policy<sup>88</sup>.

#### **4.5 ICAR Guidelines for Intellectual Property Management and Technology Transfer / Commercialization**

In the Indian NARS, the earlier approach to manage IPs was on case-to case approach taking cue from few documented rules and guidelines<sup>89</sup>. The process was more at the central headquarters and all its constituent institutes dependent on the central unit. Taking note of the new shifts and efforts at international institutes and realising the need for a more vibrant and viable system, the ICAR had initiated its efforts to devise such a policy for public agricultural research institutions. In doing so, it kept in mind its fundamental social mission to contribute to national growth and equity, consistent with the national economic and

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<sup>83</sup> "The management approach as described in the guidelines will conform to the national IPR laws and policies in force in the country. It will be in line with the legal framework required as per the TRIPS Agreement. The provisions of the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) will be recognized" Chapter 1. Page 14. In: ICAR. 2006. ICAR Guidelines for Intellectual Property Management and Technology Transfer/Commercialization. Indian Council of Agricultural Research, New Delhi. October 2006.

<sup>84</sup> Policy refers to a set of principles, rules, guidelines or mechanisms that guide stakeholders in planning and decision-making in organizations.

<sup>85</sup> Norton R.D. 2004. Agricultural Development Policy: Concepts and Experiences, John Wiley and Sons, USA. 540 pages.

<sup>86</sup> "The Government of India trust that this Statement of National Agriculture Policy will receive the fullest support of all sections of the people and lead to sustainable development of agriculture, create gainful employment on a self sustaining basis in rural areas, raise standards of living for the farming communities, preserve environment and serve as a vehicle for building a resurgent national economy" In: NATIONAL AGRICULTURE POLICY, Ministry of Agriculture, Department of Agriculture & Co-operation, Government of India. At: <http://www.nls.ac.in/CEERA/ceerafeb04/html/documents/agri.htm>

<sup>87</sup> Managing Intellectual Property – Challenges and Responses for Agricultural Research Institutes. Pages 209-217 in G.J. Persley and M.M. Latin (eds.) Agricultural Biotechnology and the Poor: Proceedings of an International Conference. 21-22 October, 1999. CGIAR, Washington DC.

<sup>88</sup> Egelyng, H. 2005. Evolution of capacity for institutionalized management of intellectual property at international agricultural research centers: A strategic case study. *AgBioForum*, 8(1), 7-17. Available on the World Wide Web: <http://www.agbioforum.org>.

<sup>89</sup> "ICAR Rules and Guidelines for Training, Consultancy, Contract Research and Contract Services, 1997", the "ICAR Guidelines for Filing Patent Applications, 2001" and the "Memorandum of Association: Rules and Bye-Laws of the Indian Council of Agricultural Research Society, 2000".



agricultural policies<sup>90</sup> and the legal framework at the national and international fora. The entire process, spanning over two years, was through detailed review at in-house levels, through the discussions from practitioners of IP management in other fields<sup>91</sup>, at national<sup>92</sup> and international levels<sup>93</sup>. All these efforts culminated in the establishment of its current decentralized IPR domain since October 2, 2006.

This set in the implementation of 'ICAR Guidelines for Intellectual Property Management and Technology Transfer / Commercialization' in all its institutes<sup>94</sup>. Besides providing the working guidelines for facilitation of IP management and technology transfer activities, ICAR has also delegated powers to all Directors of its institutes to execute protection, maintenance and transfer of the IP subsisting in the ICAR's research results for the benefits of farmers and farm enterprises. Many state agricultural universities (SAUs) have also adopted the ICAR guidelines in spirit, either as such or by making suitable modifications to meet their specific needs<sup>95</sup>.

#### 4.5.1 Institutional Arrangements

The guidelines describe the institutional arrangement for IP management. A Central Technology Management Committee<sup>96</sup> (CTMC) at the ICAR headquarters is chaired by Director General, ICAR and is the apex decision-making body. All matters of policy concerning IPR portfolio management and technology transfer/ commercialization are decided by the CTMC. At the respective ICAR institutions, the Institute Technology Management Committee<sup>97</sup> (ITMC), chaired by the Director of the Institution, is the final decision making body for IP related matters/progress/concerns at that institute. Further, selected institutes at the zonal level have been designated as the Zonal Institute Technology Management Committee<sup>98</sup> (ZITMC). These committees take decisions for the IPR portfolio management and technology transfer/ commercialization of the ICAR institutions in the zone and also the inter-institutional matters in that zone. The ITMCs in that zone can seek advice from zonal committees regarding their IPR portfolio and technology transfer matters. These central, zonal and institute level committees will take steps to coordinate, harmonize and synergize with other relevant committees at the ICAR headquarters/institutions.

In addition an Agro-Technology Management Centre (ATMC) has been established at ICAR headquarters for IP management and technology transfer/ commercialization. ATMC functions as the secretariat of CTMC at ICAR headquarters. At the level of ICAR institutions, Institute Technology Management Units (ITMUs) have been established since 2007. These units are responsible for IP protection/ management and technology transfer/ commercialization with internal capabilities as well as external legal and business experts wherever required. The ITMUs act as Secretariat for the respective ITMCs. Selected ITMUs

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<sup>90</sup> Rao, N.H. and R. Kalpana Sastry. 2004. Towards a policy for Management of Intellectual Property in Public Agricultural Research Systems in India. *Journal of Intellectual Property Rights* Vol. 9. May 2004 pp 242-259.

<sup>91</sup> CSIR Guidelines for technology Transfer and Utilization of Knowledge base. Council of Scientific and Industrial Research, New Delhi, January 2002. 83p.

<sup>92</sup> NAAS, 2003. IPR in Agriculture. Policy Paper 19. National Academy of Agricultural Sciences. New Delhi.

<sup>93</sup> Cornell Intellectual Property Hand Book. Cornell Research Foundation, Inc., Ithaca. 26p.+ Appendices.

<sup>94</sup> ICAR. 2006. ICAR Guidelines for Intellectual Property Management and Technology Transfer/ Commercialization. Indian Council of Agricultural Research, New Delhi. October 2006. pages 120

<sup>95</sup> Three state agricultural universities have now initiated the process. At the State level, the Government of Kerala approved the Intellectual Property Rights Policy for Kerala, 2008. The policy envisages the setting up of a specialized governmental body called the Supervisory Council on Intellectual Property (SCIP) to oversee the activities of the proposed Kerala Traditional Knowledge Authority (KTKA) and State Bio-diversity Board (SBB) with regard to the protection of traditional knowledge, to provide overall supervision in matters relating to Intellectual Property Rights, and to follow up the recommendations of the KTKA with regard to prosecutions for the violation of knowledge-users' rights. Government Order G.O. (Ms) No. 127/2008/Law Dated, 22/12/08. Government of Kerala.

<sup>96</sup> Short title for Central IP Management and Technology Transfer/ Commercialization Committee

<sup>97</sup> Short title for Institute IP Management and Technology Transfer/ Commercialization Committee

<sup>98</sup> Short title for Zonal Institute IP Management and Technology Transfer/ Commercialization Committee

at national/central institutions in different zones are designated as Zonal Agro-Technology Management Centres (ZTMCs) (Fig. 6).

#### 4.5.2 Issues of Governance of IP Policy

Recognising the strong need to build capacity in manpower for an effective working of its IPR domain, the ICAR has scaled the previously existing component of IPR and a new scheme "Intellectual Property Management and Transfer/Commercialization of Agricultural Technology Scheme has been initiated to cater to budgetary needs for capacity building at the ITMUs, ZTMCs and ICAR headquarters<sup>99</sup>. The IPR & Policy Unit at ICAR headquarters under the guidance of CTMC is spearheading efforts on capacity building on IP management. NAARM is closely associated with this activity<sup>100</sup>. Since May 2007, a country wide campaign has been launched and 9 thematic programs have been conducted to about 300 participants across the ICAR institutes and SAUs.

#### 4.5.3 Possible Types of IPs on Research Works in ICAR system

Apart from the institutional arrangements, the guidelines also define boundaries for various IP generated in ICAR. While ownership revolves with solely with ICAR from research work conducted through the use of funds from it; Collaborative projects results are to be processed for IP ownership as per the agreements.

The guidelines clearly indicate that the provisions of Sec 3<sup>101</sup> in Indian Patent Act are to be adhered to. Since the Act does explicitly specify that any method relating to the treatment of plants is patentable it can be interpreted that the Act allows an invention to be patented that is merely a method of making plants free of disease. Also, a process for improving the plant's value or increasing the value of the plant's products is patentable. The living entity of artificial origin such as microorganism, vaccines are considered patentable. The biological material such as recombinant DNA, plasmids and processes of manufacturing thereof are patentable provided they are produced by substantive human intervention. In addition, the processes relating to microorganisms or producing chemical substances using such microorganisms are patentable. Patents are now permissible for "processes or methods of production of tangible and nonliving substances" like enzymes, hormones, and vaccines, processes using bioconversion, microorganisms, biologically active substances, biotechnology, microbiology, and/or chemical substances produced by using genetically

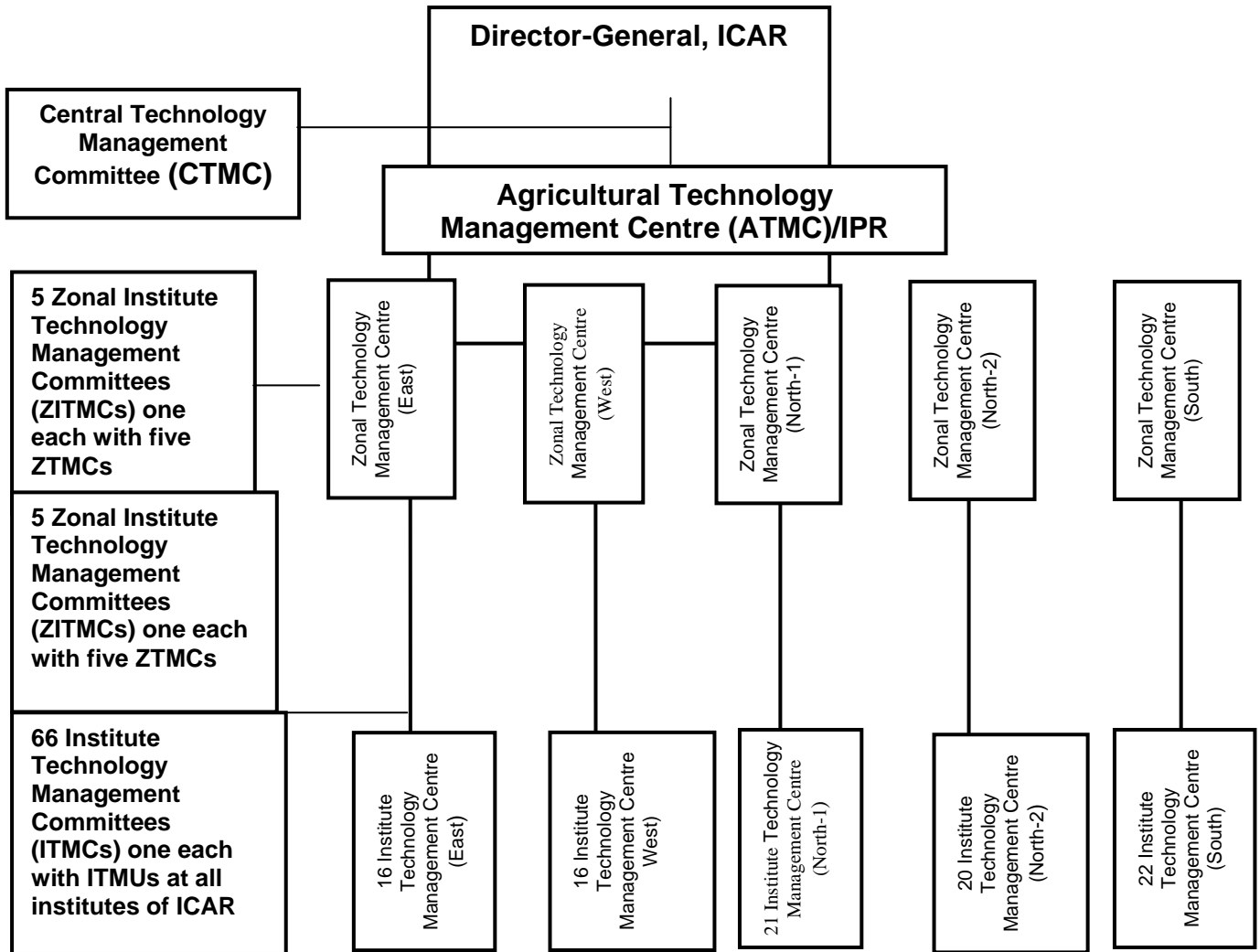
<sup>99</sup> ICAR Training cum workshops on IP and technology management. September 2008. ICAR .KAB-I, Pusa, New Delhi.

<sup>100</sup> ICAR. 2006. Chapter 12. Pages 66-69 supra at n.27.

<sup>101</sup> As per Sec. 3 of the Patents Act, 1970 as amended in 2002 and 2005, the following are not inventions within the meaning of this Act, - (a) an invention which is frivolous or which claims anything obvious contrary to well established natural laws; (b) an Invention the primary or intended use or commercial exploitation of which would be contrary to public order or morality or which causes serious prejudice to human, animal or plant life or health or to the environment; (c) the mere discovery of a scientific principle or the formulation of an abstract theory or discovery of any living thing or non-living substances occurring in nature; (d) the mere discovery of a new form of a known substance which does not result in the enhancement of the known efficacy of that substance or the mere discovery of any new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant.;(e) a substance obtained by a mere admixture resulting only in the aggregation of the properties of the components thereof or a process for producing such substance; (f) the mere arrangement or re-arrangement or duplication of known devices each functioning independently of one another in a known way; (g) void, (h) a method of agriculture or horticulture; (i) any process for the medicinal, surgical, curative, prophylactic, diagnostic, therapeutic or other treatment of human beings or any process for a similar treatment of animals to render them free of disease or to increase their economic value or that of their products; (j) plants and animals in whole or arty part thereof other than microorganisms but including seeds, varieties and species and essentially biological :processes for production or propagation of plants and animals; (k) a mathematical or business method or a computer programme *per se* or algorithms; (l) literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever including cinematographic works and televisions productions; (m) a mere scheme or rule or method of performing mental act or method of playing game; (n) a presentation of information; (o) topography of integrated circuits; (p) an invention which, in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components.

engineered organisms. While clones and new variety of plants are not patentable, the process / method of preparing genetically modified organisms are patentable subject matter. These provisions make several outputs from research under ICAR qualify for getting IP protection in form of patents, copyrights and designs. Various forms of research results may be patentable, protectable in any form of other IP or not protectable under law for projects in ICAR are listed in Table 4.1.

**Fig. 6. Three- Tier Mechanism for IP Management in ICAR System**



**Table 4.1 Types of IP<sup>102</sup> permitted on Results Generated in ICAR System**

S. No.	IP	Legislation	Forms of Research Results
1.	Patent	The Patents Act, 1970 and its amendments	<ul style="list-style-type: none"> <li>• Microorganism based formulations, viz bio-control agents, biofertilizers, specific dairy catalysts, etc., and the processes for their use.</li> <li>• Various genetically engineered microorganisms for an array of specific uses, such as biodegraders, bio-stimulants, bio-protectants, etc., and the processes related to their application/use.</li> <li>• Novel dairy and horticultural products, bye-products, such as enzymes, and processes for their production and use</li> <li>• Plant based agro-chemicals, their purification and testing processes, and various formulations.</li> <li>• Diagnostic kits.</li> <li>• Agricultural machinery, implements, and laboratory equipment.</li> <li>• High value compounds from terrestrial, aquatic and living systems, such as animal rumen, Intenodal cavities of bamboos, etc.</li> <li>• Novel genes from microbial and higher biological systems;</li> <li>• Research tools of genetic engineering, such as gene primers, constructs, and gene transfer tools like gene gun, etc.</li> <li>• Information systems with software, etc.</li> <li>• Patentable part of know-how, for scaling up of research results or manufacture of prototypes/ commercial products</li> <li>• Microorganisms<sup>103</sup></li> <li>• Processes leading to the development of Genetically Modified Organisms (GMO)<sup>104</sup></li> </ul>
2.	Design	The Design Act, 2000/ Copyright Law, 1957	<ul style="list-style-type: none"> <li>• Designs of any commercial value, developed in ICAR, may be protected as registered designs</li> <li>• Technologies involving considerations of shape (like shape of moldboard plough), configuration (like hitched implements, mounted implements) and pattern (like straight type harrow or triangular hoe) or farm machine or any process equipment in prototype stage</li> </ul>
3.	Trade Mark	The Trade Marks Act, 1999	<ul style="list-style-type: none"> <li>• Collective mark for ICAR emblem</li> <li>• Institutes to register their trademarks and use with the collective ICAR mark</li> </ul>
4.	Geographical Indication	The Geographical Indications (Registration and Protection) Act, 1999	<ul style="list-style-type: none"> <li>• A collective intellectual property of the community</li> <li>• Is not in the ICAR's IPR domain</li> <li>• Assistance and advice being given as 'technological backstopping' to concerned parties<sup>105</sup> for processing as agricultural GIs of specific national and regional interests</li> </ul>
5.	Copyright	The Copyright Act, 1957	<ul style="list-style-type: none"> <li>• Institutional creations/ works, viz., publications, audio-visuals, designs, computer programmes, databases, websites, cd-roms, software, multimedia product.</li> <li>• Rights on individual creations as allowed by the law permitted</li> </ul>

<sup>102</sup> Chapters 3,5 6 and 7. Supra at n. 27.

<sup>103</sup> ICAR will not seek patent on a microorganism in the same form in which it is retrieved from its natural habitat.

<sup>104</sup> Animal/ poultry breeds, fish strains, etc., cannot be protected in India as patents or variety protection.

<sup>105</sup> The GI Act provides for the facilitator role by some other relevant bodies in the registration and protection of GIs

S. No.	IP	Legislation	Forms of Research Results
6.	Plant varieties	The Protection of Plant Varieties and Farmers' Rights Act, 2001	<ul style="list-style-type: none"> <li>• ICAR varieties of field, horticultural and agro-forestry crops, including the new, extant, essentially derived varieties (EDV), and transgenic plant varieties protected as per the PPV&amp;FR Act/ plant variety protection (PVP) laws of other countries<sup>106</sup></li> </ul>
7.	Undisclosed information	The Contract Act, 1872; Common (Civil) Law	<ul style="list-style-type: none"> <li>• A know-how available with ICAR, constitutes an important, potentially useful property, irrespective of whether it is patentable or not<sup>107</sup></li> <li>• ICAR protects such know-how as trade secret</li> <li>• Execute the confidentiality agreements in case of usage by other parties</li> </ul>
8.	Traditional knowledge and other assets	None	<ul style="list-style-type: none"> <li>• ICAR shall also disclose the traditional knowledge related to the innovations made in its set up in all its patent/ IPR applications to the best of its knowledge and information<sup>108</sup></li> <li>• Recognizes that isolation of indigenous genes from plant and animal systems and their application for specific target traits has special significance and prospects</li> <li>• The bureaus for genetic resources (plants, animals, fish and agriculturally important microorganisms ) make efforts to register, document and index these knowledge items in public domain<sup>109</sup></li> </ul>

The requirement for biological materials<sup>110</sup> including the deposit of the material at the institution (as per the Budapest Treaty of which India is a signatory) are other conditions needed to met and which the guidelines are indicated explicitly. However, the reference samples deposited at the Genetic Resources Bureaus of ICAR are encouraged. Though these are helpful for internal reference, against a premise that in case of any litigation, it is likely that the evidence in the form of 'such duly characterized and documented referral sample that can be held valid at the discretion of a Court of Law', the guidelines strongly encourage ICAR institutions to initiate processes towards deposits at National Bureaus for Genetic resources in ICAR system<sup>111</sup>. Therefore, all ICAR institutions must take individual initiative of depositing a referral sample at the respective National Bureaus for Plants, Animals, Fish and Microorganisms Genetic Resources before filing a patent for any invention based on biological material.

Procedures for registration for plant varieties as per the provisions of PPV&FR Act, 2001 have been clearly indicated in the guidelines in Chapter 7. As a policy, ICAR has prioritized action to apply for the registration and protection under the PPV&FR Act of its extant varieties of different crops which are already notified under the Seeds Act, 1966 but have not completed 15 years from the date of notification. The National Bureau of Plant

<sup>106</sup> The types of plant varieties for legal protection include :All extant varieties of ICAR, i.e., the previously notified varieties under section 5 of the Seeds Act, 1966, which have not completed 15 years from date of their notification; New plant varieties identified for their worth (value for cultivation and use) in ICAR, which fulfill the essential criteria of distinctiveness, uniformity, and stability under the PPV&FR Act and ICAR plant varieties and transgenic plants, protectable as per corresponding PVP laws of other countries, in the form of PVP certificate, plant patent, etc.

<sup>107</sup> Confidentiality agreement with the other party shall be entered into before any demonstration of the technology or its validation or scaling up is undertaken.

<sup>108</sup> The Indian Patents Act and some other IPR Acts require a disclosure of traditional knowledge used in the invention/innovation.

<sup>109</sup> This step is to discourage any patenting of the public domain traditional knowledge.

<sup>110</sup> Section 10 of the IPA, 197

<sup>111</sup> Five National Bureaus for Genetic Resources (one each for Plants, Animals, Fish and Agriculturally important microorganisms) are functioning in ICAR system. All these serve as repository for collections in various groups and are also used as referral agencies by National Biodiversity Authority established under the BD Act, 2002.

Genetic Resources (NBPGR<sup>112</sup>) has been notified as the Nodal Institute to facilitate this action. All other ICAR institutions are to provide all the necessary information required under the PPV&FR Act/Rules for registration of extant varieties developed by them to NBPGR. This includes the particulars required for the National Register of Plant Varieties, such as the denomination of the variety, names of breeders involved in its development, pedigree details, salient features of identity vis-à-vis most similar varieties, zone(s) of adaptation, performance limits under specified situations particularly for DUS traits, etc. along with a referral seed sample. NBPGR verifies the database of extant varieties developed and maintained at the Bureau. It supplements the information with the molecular profile of the variety, if available. Authenticated seed samples of the variety are to be deposited in the active and base collections at the national gene bank at NBPGR. At the institutional level, process for applying is through the respective ITMU/ZTMC. The protocol for the process has been detailed and is in process in several institutes.

Since animal, poultry breeds, fish strains<sup>113</sup>, etc., cannot be protected in India as patents or variety protection are not patentable in India as the laws do not permit and no *sui generis* system is available to animal breeds. However, it is well known that the farm animal genetic resources<sup>114</sup> have remained the back-bone of Indian agrarian economy through contributing milk, meat, egg, fibre, draught power and manure. India is one of the main centres of animal biodiversity, particularly for domesticated animals, such as buffalo, goat, sheep, cow, horse, camel etc. Improved breeds/ strains from indigenous animal biodiversity over several decades developed in ICAR system constitute valuable assets. With an objective to check their misuse or exploitation, ICAR is developing a system of their registration<sup>115</sup> and documentation, at the respective National Bureaus of Animal and Fish Genetic Resources for placing these assets through disclosure in the public domain thereby forestalling any unforeseen patenting in other countries. For instance an authentic national documentation system of valuable sovereign genetic resource with known characteristics, a mechanism for "Registration of Animal Germplasm" has been initiated at National Bureau of Animal Genetic Resources (NBAGR)<sup>116</sup>. This would provide protection to the valuable animal genetic diversity and facilitate its access for genetic improvement of animal breeds<sup>117</sup> at national level. Similar attempts are being done for fish<sup>118</sup> and agriculturally important microbes<sup>119</sup>.

These mechanisms of protection are often termed as 'soft protection'. But these must be viewed as attempts by the national system to pre-empt any unforeseen grant of patents on animals/fish including the improved breeds/strains and important microbial populations from India. The existing model existing system of plant germplasm registration at NBPGR is being extended to register and document the elite and new breeds/strains of animals/poultry fish and agriculturally important microbes developed in ICAR. As a policy, ICAR endeavours to monitor the registration and documentation activity in plants, animals and fish in public interest.

To elucidate the attempts for operationalization the IP policy and guidelines, discussions with Policy Unit at the ICAR headquarters were made. A check list of 30

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<sup>112</sup> NBPGR is the nodal organization in India for exchange, quarantine, collection, conservation, evaluation and the systematic documentation of plant genetic resources. At:<http://www.nbpgr.ernet.in/>

<sup>113</sup> Sec.3( b)IPA,1970

<sup>114</sup> As per FAO, Animal Genetic Resources (AnGR) refer to those animal species and the populations within each species that are used, or may be used, for production of food and agriculture

<sup>115</sup> Special Feature. Registration of farm animal germplasm. Indian Journal of Animal Sciences 78(1):127-131.January 2008.

<sup>116</sup> Identification, Evaluation, Characterization, Conservation and Utilization of Livestock and Poultry Genetic Resources

<sup>117</sup> <http://www.nbagr.ernet.in/GUIDELINES.htm>

<sup>118</sup> National Bureau of Fish Genetic Resources (NBFGR) was established for cataloguing and conserving aquatic bioresources of India, genotyping, registration of aquatic germplasm, gene banking and evaluation of endangered and exotic fish species At: <http://www.nbfgr.res.in/index.htm>

<sup>119</sup> National Bureau of Agriculturally Important Microorganisms (AIMs) is the nodal Institute at national level for acquisition and management of indigenous and exotic microbial genetic resources for food and agriculture, and to carry out related research and human resource development, for sustainable growth of agriculture. At:<http://www.nbaim.org/>

indicators<sup>120</sup> (Annexure v) for IP and technology commercialization was administered. Data collected indicates that initial attempts towards operationalizing have been made. Budgetary provisions with administrative sanctions<sup>121</sup>, creating the organisational bodies and training the personnel in these bodies<sup>122</sup> have been the main focus of the IPR Unit at ICAR headquarters since 2007. Three areas viz. like speedier process for extant varieties registration, faster decision making channels and stronger IP portfolio making at institutes were identified as areas that needed more attention and intervention needed. IP inventory and audit completed (for IP used in research, including plant genetic resources) to assess freedom to operate, mechanisms for valuation of IP in place and infringements are areas still to worked out. It is also encouraging to note that several outputs have processed for patents in India. PCT filings and few grants in other jurisdictions have also been initiated<sup>123</sup>.

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<sup>120</sup> Refer Annexure v for details

<sup>121</sup> Administrative guidelines are included in the ICAR's IPR Guidelines, which are supported by a 5-year XI Plan budget sanction. In addition, ICAR's Rules and Guidelines on Professional Service Functions (Training, Consultancy, Contract Research and Contract Service) have been updated and aligned with ICAR's IPR Guidelines. These are, however, under consideration of a Committee constituted for the purpose

<sup>122</sup> 12 sensitization programs completed during 2007-08. Over 570 related scientists and staff of National Agricultural Research System, that includes not just ICAR but also Agricultural Universities, given exposure on all the dimensions of 'IPRs and Technology Transfer'

<sup>123</sup> About 300 patents include both 'applied' and 'granted' from Indian Patent Office. 4 PCT applications, 2 granted in other countries

## 5. Project Directorate on Poultry (PDP)

*"The very essence of the creature is novelty and hence we have no standard by which to judge it". Carl R Rogers.*

The animal based research institute under ICAR studied in this case study was the Project Directorate on Poultry. The Project Directorate on Poultry (PDP) is a constituent of the Indian Council of Agricultural Research and is located in Hyderabad in Southern part of India.

### 5.1 Background

In India the value of livestock output has grown by 6 percent per annum in real terms between 1985 and 1992<sup>124</sup>. The dairy and poultry industries have contributed the major share of this growth. In 1990, livestock accounted for about 32 % of the total value of agricultural output. The increasing demand for livestock products is driven by sustained economic growth and rising incomes. In addition, the income elasticity of demand for livestock products is high, estimated at around unity for certain wealth groups in rural areas<sup>125</sup>. Poultry is now one of the fastest growing segments of the agricultural sector in India today. While the production of agricultural crops has been rising at a rate of 1.5-2 % per annum, in case of eggs and broilers, the production has been rising at a rate of 8-10 % per annum<sup>126</sup>. The growth of the poultry sector in India has also been marked by an increase in the size of the poultry farm<sup>127</sup>. For example, in earlier years broiler farms used to produce a few hundred birds (200-500 chicks) per cycle on an average. Nowadays, while units with less than 5,000 birds are becoming rare, units with 5,000 to 50,000 birds per week cycle are common indicating the increasing trends in poultry sector in India.

### 5.2 Genesis of PDP

The history of the Directorate dates back to the IV Plan<sup>128</sup> period, when it had its origin in the form of All India Coordinated Research Project (AICRP) on Poultry Breeding<sup>129</sup>, an all India net work project launched by the ICAR with the objective of augmenting commercial poultry production and achieving self-sufficiency in the country. The coordinating unit of the project was located at the Poultry Research Division, Indian Veterinary Research Institute (IVRI), which monitored the AICRP centres located in different State Agricultural Universities (SAUs) and ICAR Institutes. The coordinating unit operated from IVRI till 1979, after which it functioned from the newly established Central Avian Research Institute.

Considering the importance of the project in improving commercial large scale poultry production in the country, the coordinating unit was elevated to the status of Directorate on 1<sup>st</sup> March 1988 and established at Hyderabad and named as "Project Directorate on Poultry". The activities of the Directorate were simultaneously expanded by introducing new AICRPs in

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<sup>124</sup> World Bank (1999) India Livestock Sector Review: Enhancing Growth and Development. The World Bank, Washington, D.C. and Allied Publishers, New Delhi.

<sup>125</sup> Mehta Mehta, R., Nambiar, R.G., Delgado, C. and Subramanyam, S. (2003) Annex II: Livestock Industrialization Project: Phase II – Policy, Technical, and Environmental Determinants and Implications of the Scaling-Up of Broiler and Egg Production in India. IFPRI-FAO project on Livestock Industrialization, Trade and Social-Health-Environment impacts in Developing Countries.

<sup>126</sup> Supra at n.2

<sup>127</sup> Czech Conroy.2004. Livestock Sector Growth and Poverty, with particular reference to India. Natural Resources Institute. May 2004

<sup>128</sup> The Government of India implements Five year plans. Each Five Year Plan addresses specific problems which have emerged either because of new political and economic developments in the country and in the world, or as a consequence of progress already achieved. Fourth Plan Period was 1969 to 1974. At: <http://planningcommission.nic.in/plans/planrel/fiveyr/default.html>

<sup>129</sup> All India Coordinated Research Project (AICRP) on Poultry in 1970 at Izatnagar, Uttar Pradesh. Subsequently the unit was elevated as a full-fledged Project Directorate during 1988 and shifted to Hyderabad. The objectives of the Directorate were to coordinate research at AICRP centers located across the country and conduct research on the development and improvement of chicken lines for commercial and rural poultry production



Poultry Nutrition and Housing and Management with centres located in selected SAUs, where the breeding units were already in existence. The research work in these three areas continued till March 1993, after which the nutrition and housing & management activities were discontinued and the breeding project continued. In addition to coordination of AICRP, the Directorate was given the task of developing suitable germplasm for rural poultry production, maintenance and improvement of elite broiler and layer purelines (for meat and egg), maintenance of random bred control populations, and the naked neck and dwarf gene lines for tropical poultry production. The primary focus of research was on breeding.

### 5.3 Mandate

The Directorate formulated the Perspective Plan for a period of 25 years, called "Vision 2025". Keeping in view the present needs of poultry farming in the country and the challenges ahead, the research agenda has been identified with the following programmes as the priority.

- Development of germplasm for backyard/ free range farming for rural and tribal areas
- Maintenance and evaluation of layer populations
- Maintenance and evaluation of coloured broiler populations

With an aim to realize its Vision of "enhancing productivity of chicken for household nutritional security, income and employment generation" and the Mission of "developing and propagating improved varieties of chicken for sustainable production under intensive and extensive systems", the mandate of the Directorate<sup>130</sup> is:

- To coordinate and monitor ICAR-sponsored network research programmes
- To undertake applied research on genetics and breeding, and conservation of improved chicken germplasm with supportive research on nutrition, disease control and management.
- To lay emphasis on development of chicken varieties for meeting the needs of rural/tribal and other under-privileged sections of the society.

### 5.4 Governance Model of PDP

The governance model for the Directorate is headed by a Project Director who is guided and supported on an advisory role by the Management Committee and Research Advisory Committee. The research progress is monitored and reviewed by the Research Advisory Committee. The QRT has been constituted for evaluating the Directorate's performance during 2001-2006. The financial, administrative and other relevant issues were monitored by the Institute Management Committee. The institute is publically funded through the ICAR and through grants from externally funded research projects with or no collaboration with other agencies. The collaborating agencies include SAUs, and network of AICRP centers or schemes of departments like Department of Biotechnology (DBT<sup>131</sup>) and other universities. It also generates revenue of primarily through sale of germplasm to private firms and farmers. The institute has staff strength of 64 personnel with 9 scientists who are supported in their research activities by 14 technical staff personnel (Table 5.1).

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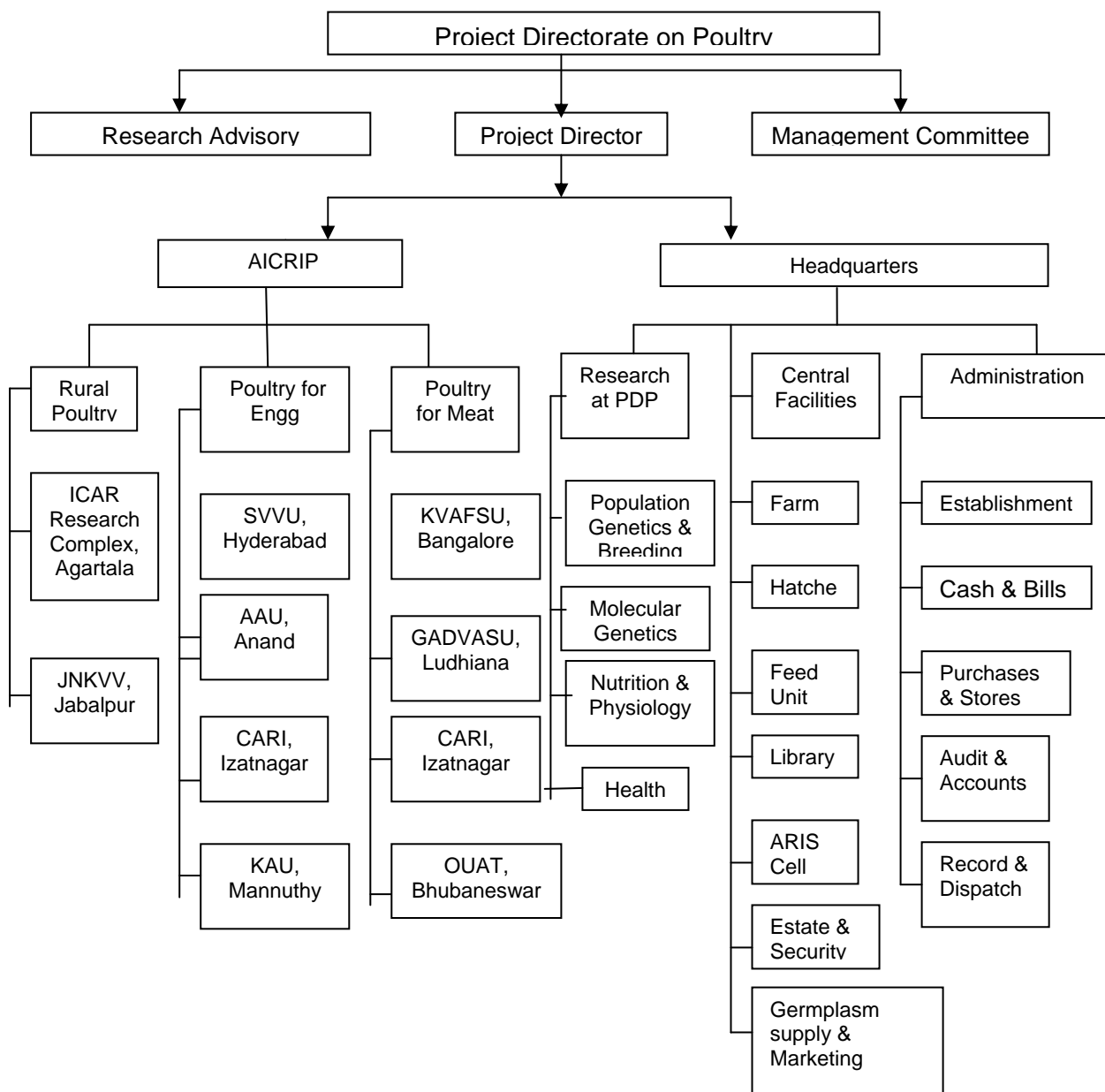
<sup>130</sup> Project Directorate on Poultry. Annual Report for 2007-08. Pages 81.

<sup>131</sup> The setting up of a separate Department of Biotechnology (DBT), under the Ministry of Science and Technology in 1986 gave a new impetus to the development of the field of modern biology and biotechnology in India. In more than a decade of its existence, the department has promoted and accelerated the pace of development of biotechnology in the country. At: [http://dbtindia.nic.in/uniquepage.asp?id\\_pk=4](http://dbtindia.nic.in/uniquepage.asp?id_pk=4)

**Table 5.1 Staff Position**

Grade	Sanctioned	In position	Vacant
Director - RMP	01	01	Nil
Scientific	15	09	06
Technical	15	14	01
Administrative	13	10	03
Supporting	20	18	02
<b>Total</b>	<b>64</b>	<b>52</b>	<b>12</b>

**Fig 7. Organogram of PDP**



The four research units at the Directorate are: Population Genetics & Breeding, Molecular Genetics, Nutrition and Physiology, and Health. There are nine scientists and thirteen technical personnel in position. In addition to the Directorate is responsible for coordination of coordinating unit under AICRP. There are 10 network centers under the AICRP on Poultry Breeding, located across the country in SAU's and ICAR institutes (Fig 7).

## 5.5 Research Activities

The primary focus of research was on breeding with supportive research on nutrition, health cover and molecular genetics formed an integral component of the research agenda of the Institute. The four research units at PDP are mandated to carry out applied and technology generating research on chicken involving breeding, duly supported by nutrition and health cover with the emphasis on developing high yielding germplasm for rural and tribal farming. A repository for two random-bred control populations (one each for layer and broiler type of chicken) is also maintained along with a germplasm center to make available the improved strains and stocks to the user agencies. Further research efforts are underway for developing newer crosses that are tailor-made for adoptability under rural conditions. Attempts are also on to provide better nutrition and health cover packages for pure lines, parents and crosses. The molecular genetics tools also have been used in the breeding programmes as complementary to the conventional popular genetics.

The Directorate coordinates and monitors the network project of All India Coordinated Project on Poultry Breeding, being implemented in a total of 10 centres located in different Agricultural/Veterinary Universities and ICAR institutes. The primary objective of the project is to develop high yielding stocks of broilers and layers for commercial farming and thereby make the country self-reliant. Besides, another component of rural poultry was added and being implemented at Agartala<sup>132</sup> and Jabalpur<sup>133</sup>.

In addition to coordination of AICRP, the Directorate is mandated to develop suitable germplasm for rural poultry production, maintenance and improvement of elite broiler and layer purelines (for meat and egg), maintenance of random bred control populations, and the naked neck and dwarf gene lines for tropical poultry production. These research programmes focus on research relevant to societal needs, and application-oriented research towards commercialization. These include the areas of poultry breeding, molecular genetics, applied nutrition, immunomodulation, disease diagnosis and health management etc. During last few years, research on nutrition, health cover and molecular genetics form an integral component of the research agenda of the Institute with funding from in-house sources and several external sponsors. A list of ongoing research projects underway is listed at Table 5.2.

**Table 5.2. List of On-going Research Projects**<sup>134</sup>

S.No.	Title
<b>I. Institute sponsored projects</b>	
<b>A. Breeding</b>	
1.	Development of germplasm for backyard/ free range farming for rural and tribal areas
2.	Maintenance and evaluation of coloured broiler populations
3.	Maintenance and evaluation of layer populations
4.	Maintenance and evaluation of gene lines
<b>B. Molecular genetics</b>	
5.	Molecular characterisation of layer and broiler germplasm
6.	Candidate gene approach for QTL analysis pertaining to egg production traits in layer chicken
<b>C. Avian Nutrition &amp; Physiology</b>	
7.	Development of nutritional package of practices for rural poultry germplasm during nursery rearing
8.	Nutrient requirements and feeding schedules of coloured broiler populations
9.	Nutrient requirements and feeding schedule for parent lines of <i>Vanaraja</i>
10.	Effect of supplemental organic Zn on coloured broiler breeders and their progeny

<sup>132</sup> In State of Tripura, North-Eastern part of India

<sup>133</sup> Central India

<sup>134</sup> Supra at n. 7.

11.	Effect of semen quality parameters on fertility in chicken
12.	Collaborative project with CIMMYT on "Utilization of quality protein maize in poultry diets"
<b>D. Avian Health</b>	
13.	Molecular identification, characterization and control of infectious neoplastic diseases
14.	Disease surveillance, monitoring and control in poultry germplasm at PDP
15.	Expression profiling and molecular characterisation of Toll-like receptors in chicken
<b>II. Collaborative projects*</b>	
16.	Improvement of backyard poultry in Kashmir Valley ( <i>SKUAST, Srinagar</i> )
<b>III. Ad-hoc schemes* (DBT)</b>	
17.	Quantitative Trait Loci (QTL) identification in broilers

\*Funded through external agencies

The concerted efforts made by AICRP centers resulted in the release of certain promising crosses for commercial exploitation. The potential of these crosses was evaluated in Random Sample Poultry Performance Tests and found them to be at par with most of the commercial crosses that are being marketed by the industry. The promising crosses released from AICRP centres are tabulated in Table 5.3.

**Table 5.3. Promising crosses**

Layer crosses	Broiler crosses
ILI-80 ( <i>CARI, Izatnagar</i> )	B-77 ( <i>CARI, Izatnagar</i> )
ILM-90 ( <i>KAU, Mannuthy</i> )	IBL-80 ( <i>GADVASU, Ludhiana</i> )
ILR-90 ( <i>SVVU, Hyderabad</i> )	IBB-83 ( <i>KVAFSU, Bangalore</i> )
	IBI-91 ( <i>CARI, Izatnagar</i> )

### 5.7 Consultancy, Patents, Commercialization of Technology

The research at the Directorate has resulted in impacting the stakeholders. The Directorate paid special attention for evolving superior varieties over the existing native chicken breeds and developed exclusively for improving poultry production in rural and tribal areas. The two crosses, *Vanaraja* and *Gramapriya*<sup>135</sup> have been widely distributed across different parts of the country.

These successes have led in the Directorate playing a pioneering role in popularizing the concept of rural poultry production. The, other crosses, *Krishibro* and *Krishilayer* developed for intensive commercial farming have been popular among the farmers. These crosses are distributed in substantial numbers to farmers and other user agencies in the form of hatching eggs, day-old chicks, parent chicks and grown up chicks (Table 5.4). Besides, a total of 8,464 embryonated eggs were supplied to Govt. agencies for vaccine production. There are still no attempts for patents or other IPs.

<sup>135</sup> These two varieties have been extremely popular and supplied to user agencies in different parts of the country covering the southern, northern, eastern and northeastern states, including Jammu & Kashmir, Lakshadweep, the North East and Andaman & Nicobar Islands.

**Table 5.4. Germplasm supplied during 2007-08<sup>136</sup>**

<b>A.</b>	<b>Hatching eggs</b>	<b>No.</b>
	Gramapriya	163043
	Layer	8960
	Vanaraja	39008
	Krishibro	26703
	Control broiler	1260
	<b>Total</b>	<b>238974</b>
<b>B.</b>	<b>Day old chicks</b>	
	Gramapriya	15098
	Gramapriya parents	7110
	Layers	4303
	<i>Vanaraja</i>	54488
	<i>Vanaraja</i> parents	6168
	<i>Krishibro</i>	5675
	<b>Total</b>	<b>92842</b>
<b>C.</b>	<b>Grownup birds</b>	16853

## 5.8 IP Activities

Since 2006, the Directorate has initiated the implementation of IP policy of the ICAR. As part of its initiation, the ITMC and ITMC were formed in 2007. The constitution of these committees is as per the ICAR guidelines with, the ITMC being chaired by Director of the Institution. This is the highest decision making body relating to all issues of IP management and technology transfer/commercialization. The ITMC has the Director as its Chairman, with one member who is the Head of Division, two Technical Experts (Scientists of the institution) and one expert in IPR (Scientist from ICAR institutions in the zone). The Research Council of Institute is also represented by its Secretary. This is to keep a continuum with research activities of the institutes.

As part of this study, the questionnaire administered to the scientists revealed that inputs from this institute during formalizing of ICAR guidelines were meager<sup>137</sup>. This is probably type of research done earlier which was more focused on the coordination of research activities in various AICRP centers. The Directorate initially was mandated to coordinate research at AICRP centers located across the country and conduct research on the development and improvement of chicken lines for commercial and rural poultry production. After the finalization of the Vision 2025 document and re-look at its mandate, focus on new and more areas of research is now emphasized. The scientists are now aware of new IP regime and have started tuning their research programmes towards the adherence of the guidelines.

Most scientists agreed with the importance of IP but reflected the lack of awareness, knowledge and training. Only two scientists have attended awareness programs of ICAR. However, all felt the need of IP regime and the IP policy of ICAR with guidelines useful to strategize their research outputs. To the question on of public sector as a holder of IPR, it was opined that this sector should take lead role considering the clientele in India continues to be dependent on the NARS for augmenting better productivity levels. There will not be any problem if public sector becomes a major holder of IPR. Public sector should take lead role in implementing IP rights and should become major holder of IPRs in agriculture.

To the query of identification of IPs from their respective projects, there was well documented response clearly indicating their interest and awareness. A summary of possible

<sup>136</sup> The Directorate supplies these to several user agencies including Industry at nominal price

<sup>137</sup> Responses to questionnaires tabulated and appended as Annexure v.

IPs being generated from the research being pursued by the scientists is tabulated in Table 5.5. It is interesting to note that only patents form major category wherein biotechnological tools, processes and value additions to formulations formed major areas. Though the policy ensures that ICAR scientists can generate other IPs like designs, copyrights or trademarks, the emphasis here was on patents.

**Table 5.5. List of Possible IPs as identified by the Scientists**

Category of IPs	Type
Patents	<ul style="list-style-type: none"> <li>Recycling of poultry house wastes as feed and fertilizer and different Poultry feeds, protocols, value added poultry feeds, nutritional diets</li> </ul>
	<ul style="list-style-type: none"> <li>Genetic marker for economic trait</li> </ul>
	<ul style="list-style-type: none"> <li>Diagnostic kits</li> </ul>
	<ul style="list-style-type: none"> <li>molecular markers, tools</li> </ul>
	<ul style="list-style-type: none"> <li>New poultry semen extenders</li> </ul>
	<ul style="list-style-type: none"> <li>Poultry semen freezing protocols.</li> </ul>
Registration – Soft protection	<ul style="list-style-type: none"> <li>Registration of coloured broiler male line (PB-1), coloured female line (PB-2) Krishibro.</li> </ul>
	<ul style="list-style-type: none"> <li>Registration of gene lines &amp; Molecular characterization of layers and broilers</li> </ul>

Keeping the nature of the work at the Directorate and its mandate to cater to its stakeholders, promising lines and the fact that the law in India does not permit patents on animal breeds, the need to document the indigenous breeds and germplasm was voiced. This is in line with ICAR policy which clearly states that since there is no IPR enabling provision under the existing Indian law for elite animal/ genetic material in the public domain. The Directorate has now initiated the process for extending the existing system of plant germplasm registration at NBAGR to register and document the elite and new breeds/strains of animals/poultry and fish developed in ICAR, at the National Bureau of Animal Genetic Resources (NBAGR)<sup>138</sup>. It may be pointed that nearly 15 chicken breeds with identified home tracts and complete data have been registered by NBAGR since 2007<sup>139</sup>. The Directorate is also in the process of documenting the available materials in the institution and through the AICRP programmes it co-ordinates. Through a decision making process initiated through its ITMC<sup>140</sup>, it is now preparing the documentation for application registration of poultry breeds to NBAGR<sup>141</sup>. Discussions with the scientists revealed that the process of registration is a welcome step and the Directorate has large sources of breeds and elite lines needed to be registered. There is need for building a good database with details of all entries so that the application process with complete technical data needed for filing with NBAGR may be speeded up.

## 5.9 IP Check list

An analysis of the indicators for institutionalization of IP policy at the Directorate indicates positive trends in the initiation of the process (Table 5.6). More steps for awareness creation at the institute, evolving a system from project initiation, building better portfolios need more attention. A transparent information IP management system though standard inventories, audit need to be in place to hasten the operationalization of the guidelines

<sup>138</sup> Discussions with ADG(Animal Sciences) during his lecture at ICAR Training-cum-Workshop on IP and Technology Management , ICAR Training-cum-Workshop on IP and Technology Management, ICAR Res. Complex, for NEH region Barapani, Nov.19, 2008. Also refer: Special Feature. Registration of farm animal germplasm. Indian Journal of Animal Sciences 78(1):127-131.January 2008.

<sup>139</sup> As in :<http://www.nbagr.ernet.in/Accession%20number%20for%20Breeds.htm#registration>

<sup>140</sup> ITMC meeting on December 19,2008 at the Directorate.

<sup>141</sup> A format of the application for registration is available at :  
<http://www.nbagr.ernet.in/GUIDELINES.htm>

**Table 5.6: Check list of Indicators for Institutionalization of IP Management**

No	Indicator	Yes/No
1	Institutional vision and mission defined	Yes
2	Guiding principles of IP policy listed	Yes
3	IP management Unit constituted and staff trained	4 trained, others Needed
4	IP management budget allocated	Yes
5	IP management general guidelines issued	Yes
6	IP management guidelines for specific categories of IP issued	Yes
7	IP management administrative guidelines issued	Yes
8	IP inventory and audit completed (for IP used in research, including genetic resources) to assess freedom to operate	No
9	Existing databases, software, websites, multimedia products, CD-ROMs and publications protected by copyright	No
10	Copyright provisions clarified and its management regularized for different categories	Yes
11	Existing germplasm, lines, breeds registered or documented in national repositories	Initiated the process
12	IP portfolio of existing commercializable IP available	No; in public domain
13	IP decision-making flowcharts available	Yes
14	IP awareness/capacity building programmes initiated with scientists/ faculty	Yes
15	IP/patent search facilities made accessible	No
16	Proper research record books/registers designed to maintain research records, and made available	Yes
17	IP disclosure forms designed for scientists to intimate ITMC about new IP	Yes
18	Materials Transfer Agreements standardized	Yes
19	Guidelines for use of third party IP in place	Yes
20	Templates for confidentiality agreements (CAs) available	Yes
21	Proforma and guidelines for MOUs for negotiating collaboration with private sector standardized	Yes
22	Proforma and guidelines for MOUs/agreements for negotiating collaboration with other national and international organizations	Yes
23	Mechanisms for valuation of IP in place	Yes
24	Guidelines for sharing of incentives (between inventors and organization) in place	Yes
25	IP policies, management guidelines and MTAs/MOUs/CAs made available on line	Yes
26	Compliance by scientists and employees in routine use of MTAs, CAs	Yes
27	Compliance by research managers in observing guidelines, MoUs, and other agreements for collaborations with private sector and other organizations	Yes
28	IP matters coordination with other agencies –IP granting agencies/offices, legal firms	Yes
29	Procedures for protecting infringements against IP owned by the institution	No
30	Capacity building initiatives	Yes
31	No of technologies patented protected	Registration of 9 breeds initiated
32	No. of technologies commercialized	3

No	Indicator	Yes/No
33	Institutional earnings from royalties and commercialization	60 lakhs INR

Adapted from Egelying<sup>142</sup> and NHRao<sup>143</sup>

It is gratifying to note that there is trend of commercialization the technologies generated and the Directorate has well-earned reputation with its stakeholders in the transfer of its technologies. The templates for MOUs, agreements and other documents being in place, the Directorate can use a more professional and legalised system approach to transfer the research results and technologies and build better public-private partnerships. Since the initial processes of defining the vision and policy are already in place and with a positive support from the ICAR headquarters, the Directorate should be able to accelerate its efforts to utilize the IP policy too for achieving its mandate and bettering livelihoods of its stakeholders as well as build a strong IP portfolio.

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<sup>142</sup> Egelying, H. 2005. Evolution of capacity for institutionalized management of intellectual property at international agricultural research centers: a strategic case study, AgBioforum, Vol 8, No.1, pp 7-17

<sup>143</sup> N.H.Rao. 2006. Intellectual Property Policy: Institutionalizing Intellectual Property Management in Public Agricultural Research Systems. Paper presented at Assam Agricultural University. March 2006.



## 6. Directorate of Rice Research (DRR)

*"Great discoveries and improvements invariably involve the cooperation of many minds. I may be given credit for having blazed the trail, but when I look at the subsequent developments I feel the credit is due to others rather to myself." Alexander Graham Bell*

The crop-based research institute under ICAR studied in this case study was the Project Directorate of Rice Research (DRR). The Project Directorate is a constituent of the Indian Council of Agricultural Research and is located at Hyderabad, India.

### 6.1 Background

Rice is major staple food and a way of life for several stakeholders in India. Globally, India ranks first in area<sup>144</sup> and second in production. At the country level, this crop is major crop and accounts for 37 percent of total area and 43 percent of total food grain production. The green revolution in India was partially due to phenomenal increase in rice production in the country. The NARS continues to focus on the green revolution technology model of breeding short-duration high yielding cultivars, irrigation and intensive use of fertilizers and other agro-chemicals. But the deceleration in growth rates in recent times is matter of concern and new solutions to break these barriers are being worked. Since the rice industry has an important socio-economic impact in India and the rice sector is a relatively important part of the national economy, research investments by the ICAR continue on its own or through new partnerships.

### 6.2 Genesis of DRR

The Directorate of Rice Research (DRR), formerly All India coordinated Rice Improvement Project (AICRIP), was established by the Indian Council of Agricultural Research (ICAR) in 1965 with its national headquarters at Hyderabad to organize and coordinate multi-location testing of genetic lines and technologies for crop production and protection generated across the country. The Project was elevated to Directorate of Rice Research in 1985 with an added mandate of research in the thrust areas of irrigated rice.

The All India Coordinated Crop Improvement Projects (AICCIP) are experiments in the realms of applied research established by ICAR first in Maize in 1957 closely followed by Wheat and Rice in mid-sixties. The All India Coordinated Rice Improvement Project (AICRIP) which began functioning since 1966 coordinates the multidisciplinary and multi-location testing of varietal, crop management and crop protection technologies across diverse ecosystems for increasing and stabilizing the rice production in India from DRR. The Directorate as the nodal agency has adopted unique model which facilitates joint programme planning and implementation of its multi-location testing programme, exchange of germplasm and breeding material, mechanism for transfer of technology and to conduct strategic research for irrigated ecology. More than 200 scientists from 46 funded and about 70 voluntary centres of State Agricultural Universities, State Departments of Agriculture and ICAR institutes carry out planned trial/experiments of Breeding, Entomology, Pathology, Agronomy, Soil Science and Plant Physiology disciplines.

### 6.3 Mandate

The goal of the institute is to ensure food and nutritional security and augment the livelihoods of rice farmers in India. The Directorate achieves this goal by focussing on developing technologies to enhance rice productivity, resource and input use efficiency with the mandate as follows:

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<sup>144</sup> [http://beta.irri.org/statistics/index.php?option=com\\_content&task=view&id=413&Itemid=192](http://beta.irri.org/statistics/index.php?option=com_content&task=view&id=413&Itemid=192)

- To coordinate multi-location testing at national level to identify appropriate varietal and management technologies for all the rice ecosystems
- To conduct strategic and applied research in the major thrust areas of irrigated rice aimed at enhancement of production, productivity and profitability and at preserving environmental quality
- To initiate and coordinate research networks relating to problems of national and regional importance
- To serve as major centres for exchange of research material and information to accelerate the pace of technology transfer through frontline demonstrations, training programmes and ICTs.
- To develop linkages with national, international and private organizations for collaborative research programme
- To provide consultancy services and undertake contractual research

## 6.4 Governance Model of DRR

In order to fulfil the mandate effectively, DRR is headed by a Project Director and is organised into various departments/sections at its headquarters. These are Plant Breeding, Hybrid Rice, Biotechnology, Crop Production with Agronomy, Soil Science, Plant Physiology, Agricultural Engineering, Geographic Information System, Statistics; Crop Protection with Entomology, Plant Pathology, and Training/Transfer of Technology. The research programmes of DRR are supported by centralised facilities of farm, Administration, Accounts, Technical Cell and Library. The DRR has also been fulfilling its major mandate of AICRIP involving multilocation research by active participation of 196 scientific personnel in various disciplines in the 46 funded centers<sup>145</sup>.

**Table 6.1 Staff Position<sup>146</sup>**

Grade	Sanctioned	In position	Vacant
Director- RMP	01	01	Nil
Scientific	61	45	01
Technical	55	53	02
Administrative	34	33	01
Supporting	42	29	13

Forty five scientists at the headquarters organise lead research in frontier areas of irrigated rice and transfer of technology through formal training programmes and on farm frontline demonstrations. This team of scientists is assisted by 54 technical, 31 administrative and 24 supporting staff (Table 6.1).

## 6.5 Research Activities

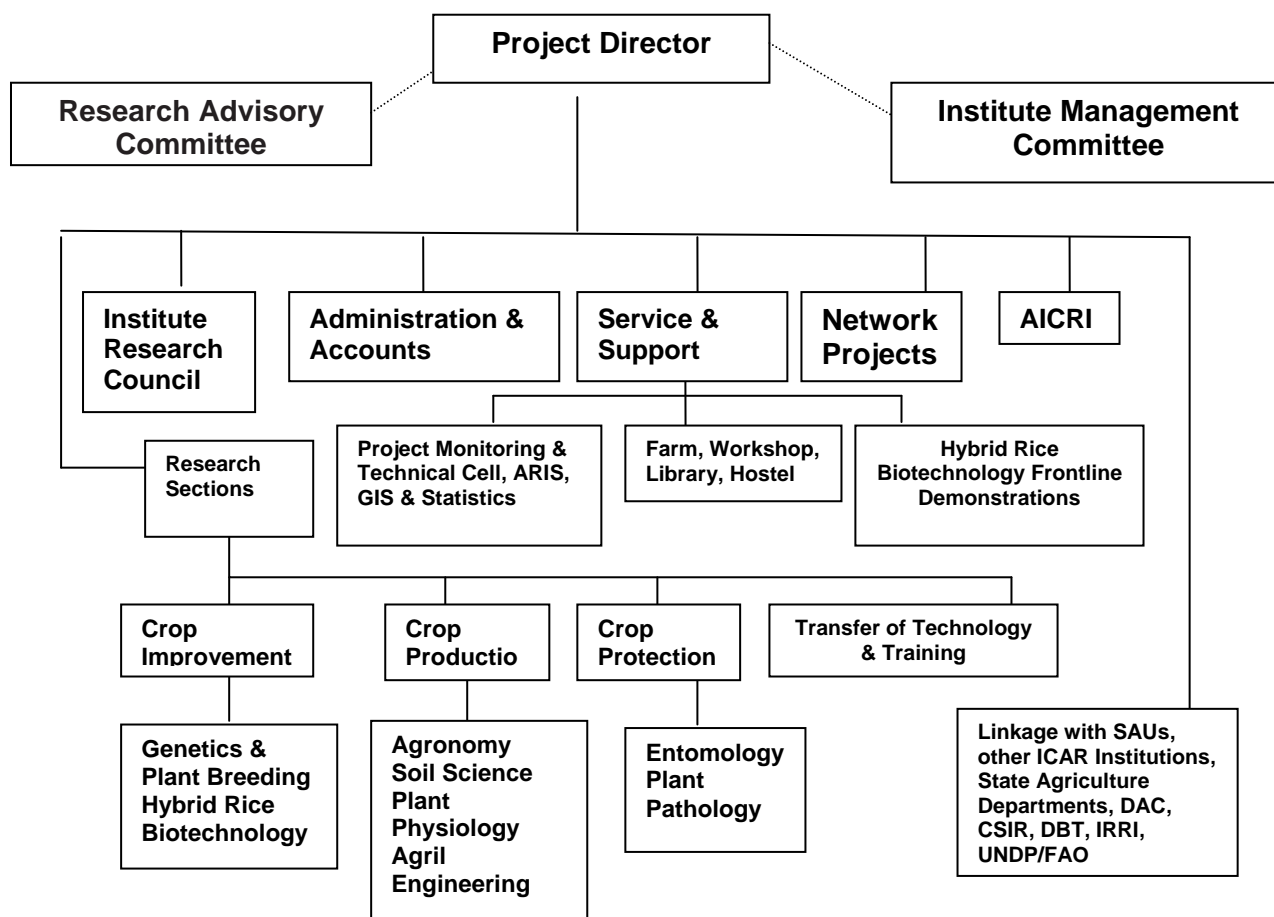
The Directorate has been engaged on systematic research on rice combining the conventional methods with modern technologies. Starting with recombination breeding, mutation breeding, gene introgression development of hybrids and gene introgression through biotechnological tools has been initiated. With the advent of biotechnological innovations, marker aided selection for major genes conferring resistance to biotic stresses is being employed in improving rice varieties. Projects are proposed and discussed at the Institute Research Council (IRC), which is the approving body for the projects. More than 40 projects encompassing the various disciplines across conventional disciplines to cutting-edge technologies in biotechnology and molecular biology are now under progress<sup>147</sup>.

<sup>145</sup> <http://www.drricar.org/>

<sup>146</sup> Directorate of Rice Research. 2007. Annual Report 2006-07. Directorate of Research. Rajendranagar. Hyderabad-500030, India.

<sup>147</sup> Details in Annexure vi

**Fig. 8. Organogram of DRR**



The Directorate has strong and wide network of linkages and collaboration with several organizations in India and abroad. Apart from AICRIP<sup>148</sup>, there are research projects under the hybrid network programmes with 12 centres. It is coordinating one network project and participating in three network programs. It also has other collaborations with universities like Delhi University, Centre for Cellular and Molecular Biology (CCMB), Centre for DNA Fingerprinting and Diagnostics (CDFD). These are public institution outside the ICAR-SAU system. At international level, it collaborates with Consultative Group on International Agricultural Research (CGIAR) institutions like International Rice Research Institute (IRRI) and International Crops Research Institute for Semi-Arid Tropics (ICRISAT). Several government agencies like Department of Science (DST), Department of Biotechnology (DBT), and ICAR system also fund the projects<sup>149</sup>. In addition, several scientists are recognised academic guides/supervisors for students who are affiliated to several universities in across the country. The research work is done using the facilities at the Directorate under the supervision of its scientists.

While the lead research in various disciplines is done at the Directorate itself, the AICRIP projects account for co-ordinated research. An approximate 20,685 elite lines

<sup>148</sup> Under AICRIP ,DRR has 46 centres affiliated to 22 SAUs; State departments and five ICAR institutes

<sup>149</sup> Detailed list in Annexure viii

developed by different cooperating centers have been tested across the country with partnership of private sector extended in testing the material in the programme as per guidelines and payment of prescribed fee. Every year about 2000 experiments/trials are laid out in rice. The testing programme follows a three tier system involving one year of Initial Varietal Trial (IVT) i.e., which constitutes the first level of testing after assigning the Initial Evaluation Trial (IET) number to each one of the nominated entries developed by different cooperating centers and two years of Advance Varietal Trial (AVT - 1 and AVT - 2) in order to identify the elite lines with consistent high yield potential which is better than the best check in each of the experiments as specified, taking into consideration the duration limits of various rice growing areas, situations, seasons and prevailing cropping patterns. Simultaneously the elite breeding lines are screened at hot spot locations as well as under artificial conditions for generating information on their pest/disease resistance/tolerance, grain quality attributes and agronomic performance. Thus, the best performing breeding lines on three years of testing across the regions for a particular ecosystem are identified by the Variety Identification Committee (VIC) in the All India Rice Workshop<sup>150</sup> and then approved for release and notification by Central Sub-Committee on Crop Standards, Notification and Release of Varieties (CSCS&NRV) for commercial cultivation and the top location specific entries are released by the State Variety Release Committee (SVRC) for a particular state. This multilocation evaluation system, which has also become a model for international nurseries evaluated worldwide by the CGIAR institutions, has recorded outstanding merit<sup>151</sup>.

This systematised approach has led to the testing and release of 836 varieties including 33 hybrids for all the ecosystems till 2007<sup>152</sup>. Among these 98 varieties including 10 hybrids were released through Central Sub Committee on Crop Standards, Notification and Release of Varieties (CSCS & NRV) while the State Variety Release Committee released 738 varieties and 23 hybrids. Of these varieties, 372 are for irrigated areas, 114 for rainfed uplands, 155 for rainfed low lands, 37 for semi deep and 14 for deep water situation, 44 for high altitudes, 31 for saline and alkaline areas, 1 for aerobic, 10 for boro and 49 aromatic long and short grain varieties were released. 26 export quality basmati rice varieties have also been released by the programme. DRR itself has developed 51 varieties and 2 hybrids for different ecologies<sup>153</sup>. Apart from this, several technologies across the disciplines of Biotechnology, Crop Production with Agronomy, Soil Science, Plant Physiology, Agricultural Engineering, Geographic Information System, Statistics; Crop Protection with Entomology, Plant Pathology have contributed to several technologies which have been success stories with its stakeholders<sup>154 155</sup>.

## 6.6 Activities under IP and Commercialization of Technology

### 6.6.1 Before the Formulation of ICAR IP Policy

DRR has been supporting IP linked activity for the ICAR even before the IP policy. Following the grant of patent to RiceTech Co. by the USPTO in 1997, the Government of India constituted a High-Level Task Force to examine the possibilities of filing for a re-examination. ICAR was also part of re-examination case and the scientists from DRR provided technical evidence<sup>156</sup>.

<sup>150</sup> Workshop are held annually for reporting the results and planning trials for ensuing season

<sup>151</sup> N.Shobha Rani,GSV Prasad,IV Subba Rao,I Sudharashan,Manish K Pandey,VR Babu, T Ram,G Padmavathi.KMularidharan,IC Pasulu and BC Viraktamath. 2008. High yielding rice varieties of India. Technical Bulletin No.33. Directorate of Rice Research, Rajendranagar, Hyderabad 5000030. India. 188pp.

<sup>152</sup> Supra at n9.

<sup>153</sup> As quoted in paper titled "Licensing of ICAR Plant Varieties/hybrids/inbred lines for commercial use by private seed agencies in rice". In: Background Information for Group Meeting on High Volume Hybrids/Parental lines held on September 29, 2008 at DRR, Hyderabad.

<sup>154</sup> Several success stories of technologies generated at the Directorate have been enumerated. Nearly 27 technical bulletins (2003 to 2007) are listed at <http://www.drricar.org/>. Few stories are uploaded at : <http://www.drricar.org/sucstories.htm>

<sup>155</sup> N.Shobha Rani and L.V.Subba Rao .2004.Sustainable management of plant Biodiversity- a success story.Technical Bulletin.No 10.

<sup>156</sup> DRR provided technical evidence and related technological documents as part of prior art evidence and also catalogues of availability of seed in DRR germplasm collection.

After the enactment of the PPV&FR Act, 2001, the National Guidelines and descriptors for DUS test in rice were prepared and published by DRR for the rice breeders of the AICRIP<sup>157, 158</sup>. The final versions of the approved guidelines were published by the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Authority in 2007<sup>159</sup>. The ICAR has approved DRR as the nodal centre for DUS testing. Hence, the Directorate has the responsibility to conduct DUS testing for the PPV&FRA. As a preparation towards this role and to fulfil this responsibility, DRR has made major effort in collecting reference collections of varieties (RCV) and their characterization and digitalization. The RCVs are used against candidate varieties since the start of DUS testing in May 2007.

### 6.6.2 After the Implementation of ICAR IP Policy

Since 2006, the Directorate has initiated the implementation of IP policy of the ICAR. As part of its initiation, the ITMC and ITMU were formed in 2007. The constitution of these committees is as per the ICAR guidelines. The ITMC is chaired by the Director, DRR. This is the highest decision making body relating to all issues of IP management and technology transfer/commercialization has nine scientists to take decisions on IP management.

The questionnaire circulated to the scientists as part of this study, revealed that most of them felt that they did not play any role during the initial discussions in formulating the IP policy of ICAR. But they contend that IPRs are needed considering the fact that India is a rich agri-biodiversity centre with lot of land races along with associated traditional knowledge. Most of them have attended various training programs but still felt that there is scope for more exposure to remove confusion. In fact, such awareness they felt is necessary for all stakeholders in rice value chain<sup>160</sup>. The ITMC has conducted in-house awareness program during January 2008. Apprehensions that IPR may prove hindrance to the public sector organizations reaching to the needs of poor farmers continue to be there. However, the formulation of a policy and the implementation through guidelines was considered a step worth pursuing.

Several forms of IP like patents for outputs from research using biotechnological tools were identified as possible IPs. (Table 6.2). In addition, trademarks and copyrights and registration of rice varieties were also considered as important IPs from the research.

**Table 6.2. List of Possible IPs as identified by the Scientists**

Category of IPs	Type
Patents	<ul style="list-style-type: none"> <li>• Novel approaches for the management of pests, resistant germplasm, mass production and formulation techniques for bio control agents.</li> <li>• Bio fertilizers, bio-control agents</li> <li>• Plant growth promoters</li> <li>• Useful enzymes</li> <li>• Novel genes from microorganisms for use in recombinant DNA technology</li> <li>• Gene sequences</li> <li>• Diagnostic kits</li> <li>• Molecular markers, tools</li> </ul>
Trademarks	<ul style="list-style-type: none"> <li>• Seeds</li> <li>• Bio-formulations</li> </ul>

<sup>157</sup> N Shobha Rani, LV Subba Rao, BC Viraktamath and B Mishra.2004.National Guidelines for the conduct of Distinctness, Uniformity and Stability-Rice, *Oryza Sativa*.

<sup>158</sup> N Shobha Rani, LV Subba Rao and BC Viraktamath .2006.National Guidelines for the conduct of Distinctness, Uniformity and Stability-Rice, *Oryza Sativa*.

<sup>159</sup> General Guidelines to the examination of DUS and the development of harmonized descriptions of plant varieties. SG/01/2007.20 February 2007.Available at : <http://www.plantauthority.in/>

<sup>160</sup> Details in Annexure ix

Copyrights	<ul style="list-style-type: none"> <li>• Publications</li> <li>• Databases</li> <li>• Digital information</li> <li>• Multimedia products</li> <li>• GIS related databases</li> <li>• Designs on tools, machinery</li> </ul>
Registration	<ul style="list-style-type: none"> <li>• Genetic stocks</li> <li>• Elite and unique lines of germplasm</li> <li>• Fixed breeding lines, segregating lines,</li> <li>• New varieties, hybrids</li> <li>• Multi-biotic resistance rice varieties</li> <li>• Rhizosphere microbial community</li> <li>• CMS lines, maintainers, restorers, parental lines</li> <li>• Transgenics</li> <li>• EDVs</li> <li>• Hybrids</li> <li>• Innovative strategies of marker-assisted breeding</li> </ul>

In case of DRR, crop variety is probably one of main outputs emanating from lead research at the head quarters and also through the coordinated research under AICRIP centers. All forms of plant varieties including new varieties, hybrids, parental lines of hybrids, warrant registration under the Indian Law. The scientists also have identified these as outputs expected from their research which may need some form of IP protection. Presumably, IP in agriculture being still a concept, the focus of most scientists was on filing for registration under the new Indian law and hence at the national level only. However, soft registration of genetic stocks / elite lines which are unique and have potential attributes of academic, scientific or commercial value are encouraged to be registered with NBPGR.

In addition, the immediate focus of DRR is to process the registration of the extant notified varieties (ENVs). The Indian Plant Variety law is perhaps the only legislation which has given the option to institutions and others to register varieties under this category. ICAR encourages its system<sup>161</sup> to utilise this option given by PPV&FR Authority<sup>162</sup>. As per the PPV&FR Act, an extant variety is the variety available in India which is either (i) notified under section 5 of the Seeds Act, 1966 (54 of 1966) or (ii) a farmers' variety or (iii) a variety about which there is common knowledge or (iv) any other variety which is in public domain. This option gives an opportunity to obtain legalised protection for several of varieties which are already in the public system and still continue to be catalytic in enhancing productivity levels of crops like rice.

The process for ICAR institutions includes filing the filled in application from along with technical questionnaire (TQ). This along with a referral seed sample is sent to NBPGR which forwards to the PPV&FR Authority on behalf of ICAR. Rice crop being among first set of notified crops by the Authority, DRR has initiated the process. 123 ENVs have been sent to NBPGR with details of particulars required which were forwarded to PPV&FR Authority and it is expected that the final stage of registration will be completed in few months. About 70 more applications in rice are in pipeline. (Table 6.32)

**Table 6.3. Extant Notified Rice Varieties (ENVs) registration<sup>163</sup>**

Stage in process	Number
ENVs sent to PPV&FRA for registration	123

<sup>161</sup> "Protection of all extant varieties of ICAR, which have not completed 15 years from the date of notification shall be taken up under the PPV&FR Act as a priority activity in a time-bound manner "Page 35. ICAR. 2006. ICAR Guidelines for Intellectual Property Management and Technology Transfer/ Commercialization. Indian Council of Agricultural Research, New Delhi.

<sup>162</sup> The deadline given by PPV&FR Authority is for three years starting May 2006.

<sup>163</sup> Status as on 31<sup>st</sup> October, 2008

ENVs ready for submission to PPV&FRA through NBPGR	21
ENVs under progress for filling	50

It is necessary to execute an extensive maintenance of seed of RCVs, example varieties, exotic varieties and candidate varieties. The scientists indicated that awareness on intricacies of process for DUS testing for rice breeders especially in AICRIP system needs to be strengthened through more capacity building programs if the filing process has to be hastened before the set deadline. Several varieties are part of large testing system spread all over the country. As pointed by the scientists, there seems to be a lack of clarity on the responsibility of testing agency (primary or secondary testing centre) in terms of filing the applications. Policy intervention on this could avoid duplication of filings which would save resources including time.

Considering the quantum of research at DRR through collaboration in the centers or through external funded projects, there is an urgent need to put in place agreements with the collaborators and sponsoring agencies. There should be a systematized activity through the ITMC. Most members opined that the ICAR guidelines have improved the awareness of the scientists in the area of IP management and provide a framework for drafting of MTAs for commercialization and transfer of technology generated. They visualize no major operational problems for implementation while institutionalizing the guidelines. With necessary support in terms of man power and infrastructure the systematization can be done even though the system is intricately complex and involves several trained personnel and agencies. However, as most scientists have major responsibilities in the lead and co-ordinated research programs of the Directorate, premier time allotment for these activities under ITMCs may be difficult especially when the research is oriented as season-bound field work. It may be necessary to have full time person overseeing this activity at DRR with guidance from the ITMC. The enormous work under plant variety registration and the added role of DRR as the DUS testing center warrants a full time appointee<sup>164</sup>, who may be well versed with the legal intricacies and technology transfer methods.

## 6.7 IP Check list

An analysis of the indicators for institutionalization of IP policy at the Directorate indicates positive trends in the initiation of the process (Table 6.4).

**Table 6.4. Check list of Indicators for Institutionalization of IP Management**

No	Indicator	Yes/No
1	Institutional vision and mission defined	Yes
2	Guiding principles of IP policy listed	Yes
3	IP management centre constituted and staff trained	Yes, Partially
4	IP management budget allocated	Yes
5	IP management general guidelines issued	Yes
6	IP management guidelines for specific categories of IP issued	Yes
7	IP management administrative guidelines issued	No
8	IP inventory and audit completed (for IP used in research, including plant genetic resources) to assess freedom to operate	No
9	Existing databases, software , websites, multimedia products, CD-ROMs and publications protected by copyright	No
10	Copyright provisions clarified and its management regularized for different categories	No
11	Existing plant varieties protected as extant varieties	In progress
12	IP portfolio of existing commercializable IP available	To be initiated
13	IP decision-making flowcharts available	Yes
14	IP awareness/capacity building programmes initiated with scientists/ faculty	Yes; partially

<sup>164</sup> ICAR has made budgetary and administrative provisions for this.

No	Indicator	Yes/No
15	IP/patent search facilities made accessible	No
16	Proper research record books/registers designed to maintain research records, and made available	Yes, Partially
17	IP disclosure forms designed for scientists to intimate ITMC about new IP	No
18	Materials Transfer Agreements standardized	Yes
19	Guidelines for use of third party IP in place	Yes
20	Templates for confidentiality agreements (CAs) available	Yes
21	Proforma and guidelines for MOUs for negotiating collaboration with private sector standardized	Yes, Partially
22	Proforma and guidelines for MOUs/agreements for negotiating collaboration with other national and international organizations	No
23	Mechanisms for valuation of IP in place	No
24	Guidelines for sharing of incentives (between inventors and organization) in place	Yes
25	IP policies, management guidelines and MTAs/MOUs/CAs made available on line	No;ICAR guidelines are available
26	Compliance by scientists and employees in routine use of MTAs, CAs	Yes
27	Compliance by research managers in observing guidelines, MoUs, and other agreements for collaborations with private sector and other organizations	Yes
28	IP matters coordination with other agencies – ICAR, IP granting agencies/ offices, legal firms	Yes
29	Procedures for protecting infringements against IP owned by the institution	No
30	Capacity building initiatives	Yes;
31	No of technologies patented/plant varieties protected	Patents: nil; varieties: 123
32	No. of technologies commercialized	4
33	Institutional earnings from royalties and commercialization	Not as yet

\*adapted from Egelying (2005<sup>165</sup>) and NHRao, 2006<sup>166</sup>

Intensifying awareness programs and capacity building in IP including DUS testing procedures, evolving a system for IP management from project initiation and building better portfolios need more attention. A transparent information IP management system though standard inventories and internal audit needs to be in place to hasten the operationalization of the guidelines. It is gratifying to note that there is trend for commercialization of the technologies generated and the Directorate has well-earned reputation with its stakeholders in the transfer of its technologies. Several products especially high value rice seed material from DRR need to be brand valued to garner more reputation with the stakeholders. The venturing of licensing with four companies and efforts for registration of varieties is welcome step and indicate the value being accorded for building up a strong IP portfolio. The high quality research being done with cutting-edge technologies in DRR necessitates an inventory of the tools used and the outputs being generated. With the templates for MOUs, agreements and other documents being in place, the Directorate can use a more professional and legalised system approach to transfer the research results and technologies and build better public-private partnerships in research collaborations and technology transfer. Against the background of defined vision and policy, the Directorate should be able to accelerate its

<sup>165</sup> Egelying,H. 2005. Evolution of capacity for institutionalized management of intellectual property at international agricultural research centers: a strategic case study, AgBioforum, Vol 8, No.1, pp 7-17

<sup>166</sup> Rao,N.H. 2006. Intellectual Property Policy: Institutionalizing Intellectual Property Management in Public Agricultural Research Systems. Paper presented at Assam Agricultural University. March 2006.



efforts to utilize the IP policy too for achieving major economic gains on one hand and balance its commitment to poor stakeholders of the major crop, the production of which plays a major role in food security and export earnings to India.

## 7. Conclusion

*"India has always believed in the middle path. It can be traced to the tendency in our cultural milieu to avoid extremes in any thought process. Intellectual property rights (IPR) management is no exception. We have tried to bring parity with international norms as required under WTO but have introduced specific variations to suit our conditions" -Anil K Gupta, 2008.*

IPRs are part of complex, multi-faceted area involving technical competence in strategic business planning, management and knowledge of techno-legal subjects. This is more challenging in sectors like agriculture. Considering the myriad of complexities in Indian agriculture system and increasingly multi-layered dimensions in the agri-value chain, IP management is a formidable challenge for all. Adopting a policy through in-house analysis and re-visiting the mandate, the Indian Council of Agricultural Research (ICAR) has set itself a road map to leverage the economic benefits of IPs arising out of its research and also address societal issues for its stakeholders predominantly in the rural sectors.

An attempt to understand the three dimensions namely, laws governing Intellectual Property in India, the mandate and goals of public sector agricultural research institutions like Indian Council of Agricultural Research (ICAR) and the policy space afforded in governance of IP assets was done in this case study. The analysis indicates that for a large National Agricultural Research System (NARS) in like the one in India, an effective policy with appropriate legal spaces would be the key to evolve appropriate and comprehensive IP management strategies. The case analysis presents the efforts being made by the huge system to systemize the policy and streamline the guidelines put in place.

The in-depth study of two constituent institutes under ICAR indicates that instruments to realize the humanitarian, academic and commercial gains of various research products and outputs are in place and that the two institutes have initiated their IP management activities. While these initial efforts set an encouraging tone, capacity building on managing the IP assets among the scientists to help them address the techno-legal complexities is urgently needed to be addressed. Since the scientists are part of several research programmes through collaborations at national and international levels, it is essential to be continuously updated on the issues relating to Intellectual Property (IP) management. The study indicates a requirement to create an awareness of intricacies of these issues among all the multiple partners of the research system. It was also clear that a more professional IP management would be needed to be set in the institutes in future. Therefore, while the building the capabilities of manpower in the area of IP management would be a pre-requisite, it is critical to initiate a working mechanism and inculcate IP portfolio management as part of research agenda in these days of multi-sectoral and multi-collaborative approaches at the national and at global levels. An IP Integrated Management System can perhaps provide solution to systematize all facets of IP management at the organizational level and be a platform of information for taking long term decisions for sharing the assets. The attempts being initiated in NARS point towards this approach only and need to be sustained to leverage higher economic gains with societal benefits in the agrarian sector in India.

## **Survey Questionnaires**

### **Survey Sheet for Experts**

1. Please describe any role you have played in formulating/implementing/providing suggestions for IP Rights in India or internationally.
2. How important do you think IPR are in India and internationally and why?
3. What do you think should be included in types of IPs as related to your research area?
4. What do you see as the possible achievements of IPRs in agriculture in India? Has there been any change after the laws as per TRIPS have been implemented.
5. What are the main limitations of IP Rights in India? Are they barriers to stakeholders in your sector?
6. How do you think these limitations/barriers can be overcome?
7. What role do you see for the public sector in implementing IP rights in India? Do you see any problems if public sector also becomes a major holder of IPRs in agriculture (in research priorities or distribution of seeds to farmers)?
8. Do you think IP policy is needed for your organization?
9. How do you think that ICAR guidelines for Intellectual Property Management and technology transfer and commercialization seek to help the researchers and stakeholders in NARS?
10. Have you come across any achievements (success stories) in establishing IP Rights in India or any countries? How can any of these measures be translated in India and internationally to better implementation of ICAR guidelines on IP and technology commercialization?
11. How can the stakeholders be involved in this process of establishing IP regime both in India and internationally?
12. What are the suggestions you would like to give to operationalize the IP guidelines of ICAR?

## **Survey Questionnaires**

### **Survey Sheet for Experts at ICAR Headquarters**

1. Please describe any role you have played in formulating/implementing/providing suggestions for IP Rights in India or internationally.
2. How important do you think IPR are in India and internationally and why?
3. What do you think should be included in types of IPs as related to the mandate of your organization?
4. What do you see as the possible achievements of IPRs in agriculture in India? Has there been any change after the laws as per TRIPS have been implemented.
5. What are the main limitations of IP Rights in India? Are they barriers to stakeholders in your sector?
6. How do you think these limitations/barriers can be overcome?
7. What role do you see for the public sector in implementing IP rights in India?
8. Do you see any problems if public sector also becomes a major holder of IPRs in agriculture (in research priorities or distribution of seeds to farmers)?
9. Do you think IP policy is needed for your organization?
10. How do you think that ICAR guidelines for Intellectual Property Management and technology transfer and commercialization seek to help the researchers and stakeholders in NARS?
11. Have you come across any achievements (success stories) in establishing IP Rights in India or any countries? How can any of these measures be translated in India and internationally to better implementation of ICAR guidelines on IP and technology commercialization?
12. How can the stakeholders be involved in this process of establishing IP regime both in India and internationally?
13. Can you list the major problems you are encountering during the process of operationalizing the guidelines of your organization,
14. How do you propose to overcome these?

## Survey Questionnaires - 2

### Survey Sheet for Experts-ITMU members

1. Please describe any role you have played in formulating/implementing/providing suggestions for IP Rights in India or internationally.
2. How important do you think IPR are in India and internationally and why?
3. What do you think should be included in types of IPs as related to your mandate of your institute?
4. What do you see as the possible achievements of IPRs in agriculture in India? Has there been any change after the laws as per TRIPS have been implemented.
5. What are the main limitations of IP Rights in India? Are they barriers to stakeholders in your sector?
6. How do you think these limitations/barriers can be overcome?
7. What role do you see for the public sector in implementing IP rights in India? Do you see any problems if public sector also becomes a major holder of IPRs in agriculture (in research priorities or distribution of seeds to farmers)?
8. Do you think IP policy is needed for your organization?
9. How do you think that ICAR guidelines for Intellectual Property Management and technology transfer and commercialization seek to help the researchers and stakeholders in NARS?
10. Please list any operational problems you face during the implementation of these guidelines in your organization.
11. How can the stakeholders be involved in this process of establishing IP regime both in India and internationally?
12. What are the suggestions you would like to give to operationalize the IP guidelines of ICAR?

## Survey Questionnaire - 3

### Survey Sheet for scientists

1. Please describe any role you have played in formulating/implementing/providing suggestions for IP Rights in India or internationally.
2. How important do you think IPR are in India and internationally and why?
3. Have you been part of awareness programmes on these issues and are you implementing some of issues on IP generation or practice in your research areas?
4. What do you think should be included in types of IPs as related to your research area?
5. Please list the projects you are handling with the tenure and your role (as PI or associate along with its funding source) and indicate possible types of IPs you could be planning to create in future.
6. What are the main limitations of IP Rights in India? Do you think they could be barriers to you or your stakeholders in your sector?
7. How do you think these limitations/barriers can be overcome?
8. What role do you see for the public sector in implementing IP rights in India? Do you see any problems if public sector also becomes a major holder of IPRs in agriculture (in research priorities or distribution of seeds to farmers)?
9. Do you think IP policy is needed for your organization?
10. How do you think that ICAR guidelines for Intellectual Property Management and technology transfer and commercialization seek to help the researchers and stakeholders in NARS?
11. Have you come across any achievements (success stories) in establishing IP Rights in India or any countries?
12. If yes, how can any of these measures be translated in India and internationally to better implementation of ICAR guidelines on IP and technology commercialization?
13. How can the stakeholders be involved in this process of establishing IP regime both in India and internationally?
14. What are the suggestions you would like to give to operationalize the IP guidelines of ICAR?

**Check list of indicators for IP and technology commercialisation**

No	Indicator	Y or N	Remarks (if any)
1	Organizational vision and mission defined	Y	ICAR's Guidelines for IP Portfolio Management and Technology Transfer/Commercialization (hereinafter referred as ICAR's IPR Guidelines) have been implemented from Oct 2, 2006.
2	Guiding principles of IP policy listed	Y	In ICAR's IPR Guidelines.
3	IP management centres constituted	Y	In ICAR's IPR Guidelines, which is supported with 5-year XI Plan budget sanction.
4	IP management budget allocated	Y	Through the 5-year XI Plan budget sanction.
5	IP management general guidelines issued	Y	In ICAR's IPR Guidelines.
6	IP management guidelines for specific categories of IP issued	Y	In ICAR's IPR Guidelines.
7	IP management administrative guidelines issued	Y	Administrative guidelines are included in the ICAR's IPR Guidelines, which are supported by a 5-year XI Plan budget sanction. In addition, ICAR's Rules and Guidelines on Professional Service Functions (Training, Consultancy, Contract Research and Contract Service) have been updated and aligned with ICAR's IPR Guidelines. These are, however, under consideration of a Committee constituted for the purpose.
8	IP inventory and audit completed (for IP used in research, including plant genetic resources) to assess freedom to operate	N	To an extent, IP inventory and audit in terms of R&D programs and their review is an established practice. However, management of intellectual assets of all kinds, beginning with their stock-taking in the 95 Institutes of ICAR, is the next exercise through Zonal Technology Management Centres (ZTMCs). ZTMCs is the middle tier in ICAR's IPR Guidelines.
9	Existing databases, software, websites, multimedia products, CD-ROMs and publications protected by copyright	Y	It is in the initial phase. But it will also form a part in the exercise referred in Column 8.
10	Copyright provisions clarified and its management regularized for different categories	Y	Provisions clarified in ICAR's IPR guidelines.
11	Existing plant varieties protected as extant varieties	Y&N	Very good progress. But the process is linked with notification of new genera and species by Govt. of India. It is a continuing exercise.
12	IP portfolio of existing commercializable IP available	Y&N	We are in the process of streamlining this dimension. However, notwithstanding this

			effort, such portfolios are generally available in each ICAR Institute.
13	IP decision-making flowcharts available	Y&N	In our many sensitization workshops, we have felt the need for still more work. This will be done.
14	IP awareness/capacity building programmes initiated with scientists/ faculty	Y	12 sensitization programs completed in the current year, 2009. Over 570 related scientists and staff of National Agricultural Research System, that includes not just ICAR but also Agricultural Universities, given exposure on all the dimensions of 'IPRs and Technology Transfer'.
15	IP/patent search facilities made accessible	Y&N	In a few institutes. But budget provision given and approach clarified and communicated to each Institute.



### Tabulation of Responses of Scientists to Questionnaire (PDP)

Q.N.	Question	Synopsis
1	Please describe any role you have played in formulating/implementing/providing suggestions for IP Rights in India or internationally.	Scientists haven't played any role in formulating/implementing/providing suggestions for IP Rights in India or internationally.
2	How important do you think IPR are in India and internationally and why?	Scientists opined that IPR issue are very important in India and internationally to protect rights in the novelty of the researches, protection of technology developed for commercial exploitation, to protect rich heritage of India and to enhance the quality of research as well to get due recognition for inventions. It is very important internationally under GATT and WTO regime.
3	What do you think should be included in types of IPs as related to your mandate of your institute?	Animal or poultry breeds are not included under IPR, whereas new varieties developed from these breeds may be included in IPR.
4	What do you see as the possible achievements of IPRs in agriculture in India? Has there been any change after the laws as per TRIPS have been implemented	IPRs have brought a change in Indian agriculture scenario. Recent guidelines and laws for IP management have been done because of earlier fighting against patents for Basmati rice, Neem and Turmeric by other countries.
5	What are the main limitations of IP Rights in India? Are they barriers to stakeholders in your sector?	Many barriers to stakeholders have been reported in this sector. The main limitations of IP in India are lack of awareness, knowledge and training. The present form of IPRs should be modified as live genetic materials in the form of lines/strains cannot be patented. Patenting process should be made easy and faster.
6	How do you think these limitations/barriers can be overcome?	Through quick registration of the improved lines/strains/varieties and by better awareness and training programmes, limitations/ barriers can be overcome.
7	What role do you see for the public sector in implementing IP rights in India? Do you see any problems if public sector also becomes a major holder of IPRs in agriculture (in research priorities or distribution of seeds to farmers)?	There will not be any problem if public sector becomes a major holder of IPR. Public sector should take lead role in implementing IP rights and should become major holder of IPRs in agriculture.
8	Do you think IP policy is needed for your organization?	Yes, IP policy is important for their organization but it should be under ICAR umbrella only.
9	How do you think that ICAR guidelines for Intellectual Property Management	ICAR guidelines for Intellectual Property Management and technology transfer and

	and technology transfer and commercialization seek to help the researchers and stakeholders in NARS?	commercialization is very useful but more training programmes are needed. ICAR should have a separate extension and marketing section.
10	Please list any operational problems you face during the implementation of these guidelines in your organization.	No operational problems reported in their organization.
11	How can the stakeholders be involved in this process of establishing IP regime both in India and internationally?	Stakeholders can be involved in the process of establishing IP regime both in India and internationally to protect their rights. They can be provided with institute's technical knowhow assistance with minimum or no investment, as they are rural / tribal poor.
12	What are the suggestions you would like to give to operationalize the IP guidelines of ICAR?	Suggestions to operationalize the IP guidelines of ICAR are better awareness and training among scientific community, higher transparency and fast processing

### Institute Research Projects 2008-09 (DRR)

Code	Project title
<b>Crop Improvement</b>	
1. GEY/BR-1 (CI/BR/1)	Breeding rice varieties with resistance to major pest and diseases.
2. GEY/BR-2 (CI/BR/2)	Improvement of quality rices for higher productivity and export
3. GEY/BR-3 (CI/BR/3)	Enhancing nutritional quality of rice through bio-fortification
4. GEY/BR-6 (CI/BR/6)	Genetic enhancement of rice yield potential in irrigated ecosystem by developing New Plant Type
5. GEY-BR-9 (CI/BR/9)	Breeding varieties for Boro
6. GEY/BR7 (CI/BR/7)	Breeding rice varieties for saline/alkaline soils
7. GEY/HY-1 (CI/HY/1)	Development and evaluation of three line hybrids with better grain quality and resistance to major pests and diseases.
8. GEY/HY-2 (CI/HY/2)	Deployment of thermo-sensitive genic male sterility (TGMS) system for developing two line hybrids
9. GEY/HY-4 (CI/HY/4)	Development and improvement of parental lines
10. GEY/HY-5 (CI/HY/5)	Breeding for high yielding rice varieties and hybrids adapted to aerobic (non- flooded irrigated, condition
11. GEY/NP-1 (CI/BT/5)	Introgression of yield contributing genes/alleles from wild species to rice using molecular markers
12. GER/BT-2 (CI/BT/2)	Genetic engineering resistance to biotic stresses
13. GEY/BT -3 (CI/BT/6)	Identification of genes for grain filling in rice
14. CI/BT/7	Application of biotechnological tools for understanding molecular basis of yield heterosis and WA-CMS trait in rice
15. CI/BT/8	Development of molecular markers for important quality traits in rice
16. CP/AG/12	Resource conservation technologies to sustain rice system productivity
<b>Crop Production</b>	
17. NP CP/AG/9	Studies on the effect of organo-inorganic P-sources on rice root system attributes and P-uptake patterns for increase in nutrient-use efficiency and grain yield response of rice genotypes, under abiotic stress conditions
18. NP CP/AG/10	Evaluation of the system of rice intensification (SRI) for its potential to save water and sustaining rice productivity
19. NP CP/AG/11	Management of sulphur nutrition in rice under rice based cropping systems for improving / sustaining productivity

<b>Code</b>	<b>Project title</b>
<b>20. CP/RUE-4 (CP/SS/6)</b>	Enhancing productivity of water in irrigated rice through integrated resource and crop management
<b>21. CP/RUE-3 (CP/SS/7)</b>	Organic farming in Irrigated rice –influence on plant growth, productivity grain quality and soil health.
<b>22. NP (CP/SS/8)</b>	Rhizosphere microbial community composition and root exudation patterns as influenced by rice genotypes and soil types
<b>23. GEY/PHY-1 (CP/PP/6)</b>	Role of osmolytes in relation to stress adaptative mechanisms in rice hybrids
<b>24. (CP/PP/8)</b>	Increasing the yield potential in irrigated rice : manipulating sources and sinks
<b>25. CP/MHY-3 (CP/ENG/4)</b>	Impact of harvesting and threshing methods on the paddy output and head rice recovery
<b>26. CP/MHY-4 (CP/ENG/5)</b>	Value addition by pelletizer using broken rice for starch based poultry feed
<b>27. GIS1 (CP/GIS/1)</b>	Development of information system for rice (RIS) GIS based RIS Expert Based Systems
<b>Crop Protection</b>	
<b>28. ENT/HPR/-1 (CPT/ENT/1)</b>	Host plant resistance (HPR) to insect pests
<b>29. ENT-3 (CPT/ENT/3)</b>	Chemical control of rice insect pests as a component of rice IPM
<b>30. HPR/ENT-9 (CPT/ENT/9)</b>	Identification and functional analysis of genes related to gall midge resistance in rice
<b>31. ENT-4 (CPT/ENT/10)</b>	Insect pest nutrient interactions with reference to plant hoppers
<b>32. ENT-5 (CPT/ENT/11)</b>	Identification of new sources and mechanisms of resistance to rice brown planthopper, <i>Nilaparvata lugens</i> and whitebacked planthopper, <i>Sogatella furcifera</i> in rice
<b>33. ENT-6 (CPT/ENT/6)</b>	Host plant resistance to yellow stem borer, ( <i>Scirpophaga incertulus</i> ) Walker in rice

### Tabulation of Responses of Scientists to Questionnaire (DRR)

Q.N.	Question	Synopsis
1	Please describe any role you have played in formulating/implementing/providing suggestions for IP Rights in India or internationally	They haven't played any role in formulating/implementing/providing suggestions for IP Rights in India or internationally.
2	How important do you think IPR are in India and internationally and why?	India is a rich agri-biodiversity centre with lot of land races along with traditional knowledge that needs to be protected in this era of globalization and commercialization. IPR helps in increasing our competitiveness in the international market as well. IPR benefit the people behind a novel product or process that have commercial importance. If India does not keep up with the pace of developed nations in this area we will lose out lot on our valuable research outputs and also on our rich Indigenous traditional knowledge.
3	Have you been part of awareness programmes on these issues and are you implementing some of issues on IP generation or practice in your research areas.	They have participated in many training programmes organized by NAARM, IARI on IP issue.
4	What do you think should be included in types of IPs as related to your research area?	Germplasm / donors registration specific for various biotic stresses, novel microbial pest control formulations, new crop management techniques for pest control, pesticide, new products and microbial are to be included in types of IPs as related to research area.
5	Please list the projects you are handling with the tenure and your role (as PI or associate along with its funding source) and indicate possible types of IPs you could be planning to create in future.	
6	What are the main limitations of IP Rights in India? Do you think they could be barriers to you or your stakeholders in your sector?	The main limitations of IPRs in India are lack of awareness and knowledge, illiteracy among farmers, lack of comprehensive patent database for free patent search, lengthy patent examination and expensive legal procedures, confusion among scientists working in public domain regarding patenting or making the technologies and products freely available to the farmers and other public agencies and obligations under RTI Act.
7	How do you think these limitations/barriers can be overcome?	By creating more awareness through workshops/ training and also through distribution of printed material at all levels including stakeholders and developing clear policies and guidelines about IPR, formation of a comprehensive patent database, simplification of legal

		procedures, In house lawyers to deal with patent issues
8	What role do you see for the public sector in implementing IP rights in India? Do you see any problems if public sector also becomes a major holder of IPRs in agriculture (in research priorities or distribution of seeds to farmers)?	Public sector should play a pivotal role in implementing IP rights in India. It should facilitate the process, help in identifying the types of IPs and also in documenting them systematically. At present, there is confusion among scientists working in public domain regarding patenting or making the technologies and products freely available to the farmers and other public agencies and obligations under RTI Act. Few felt there will be a problem if public sector becomes a major holder of IPRs in agriculture as till now public sector developed varieties are freely distributed to farmers and other material was also shared freely with other organizations. But now, with IPR regime, one should also keep in mind the farmers rights and their needs.
9	Do you think IP policy is needed for your organization?	Yes
10	How do you think that ICAR guidelines for Intellectual Property Management and technology transfer and commercialization seek to help the researchers and stakeholders in NARS?	ICAR guidelines for IPM give an idea of types of IPs and also ownership details. Guidelines are useful for patent filing and commercialization of technologies.
11	Have you come across any achievements (success stories) in establishing IP Rights in India or any countries?	They have come across many success stories such as IPR issues of Basmati rice and turmeric.
12	If yes, how can any of these measures be translated in India and internationally to better implementation of ICAR guidelines on IP and technology commercialization?	For better implementation of ICAR guidelines on IP and technology commercialization, the struggle faced by pioneers in patent filing in our system could be avoided, and same models can be adopted to protect our IPR both in India and abroad
13	How can the stakeholders be involved in this process of establishing IP regime both in India and internationally?	By regular meetings of stakeholders at all levels – regional, national and international. Creating database of traditional knowledge and products. Better partnerships between public sector and private sector organizations to share resources.
14	What are the suggestions you would like to give to operationalize the IP guidelines of ICAR?	Creating more awareness and IPs should be identified at the time of formulation of project itself and process should also be initiated. Creation of committees at Institutional level and creating active core groups in each region or institute to monitor IP are some of the suggestions to operationalise the IP guidelines of ICAR.

### Tabulation of Responses of Scientists to Questionnaire (DRR)

Q.N.	Question	Synopsis
1	Please describe any role you have played in formulating/implementing/providing suggestions for IP Rights in India or internationally	They haven't played any role in formulating/implementing/providing suggestions for IP Rights in India or internationally.
2	How important do you think IPR are in India and internationally and why?	India is a rich agri-biodiversity centre with lot of land races along with traditional knowledge that needs to be protected in this era of globalization and commercialization. IPR helps in increasing our competitiveness in the international market as well. IPR benefit the people behind a novel product or process that have commercial importance. If India does not keep up with the pace of developed nations in this area we will lose out lot on our valuable research outputs and also on our rich Indigenous traditional knowledge.
3	Have you been part of awareness programmes on these issues and are you implementing some of issues on IP generation or practice in your research areas.	They have participated in many training programmes organized by NAARM, IARI on IP issue.
4	What do you think should be included in types of IPs as related to your research area?	Germplasm / donors registration specific for various biotic stresses, novel microbial pest control formulations, new crop management techniques for pest control, pesticide, new products and microbial are to be included in types of IPs as related to research area.
5	Please list the projects you are handling with the tenure and your role (as PI or associate along with its funding source) and indicate possible types of IPs you could be planning to create in future.	
6	What are the main limitations of IP Rights in India? Do you think they could be barriers to you or your stakeholders in your sector?	The main limitations of IPRs in India are lack of awareness and knowledge, illiteracy among farmers, lack of comprehensive patent database for free patent search, lengthy patent examination and expensive legal procedures, confusion among scientists working in public domain regarding patenting or making the technologies and products freely available to the farmers and other public agencies and obligations under RTI Act.
7	How do you think these limitations/barriers can be overcome?	By creating more awareness through workshops/ training and also through distribution of printed material at all levels including stakeholders and developing clear policies and guidelines about IPR, formation of a comprehensive patent database, simplification of legal procedures, In house lawyers to deal with patent issues
8	What role do you see for the public	Public sector should play a pivotal role in

	sector in implementing IP rights in India? Do you see any problems if public sector also becomes a major holder of IPRs in agriculture (in research priorities or distribution of seeds to farmers)?	implementing IP rights in India. It should facilitate the process, help in identifying the types of IPs and also in documenting them systematically. At present, there is confusion among scientists working in public domain regarding patenting or making the technologies and products freely available to the farmers and other public agencies and obligations under RTI Act. Few felt there will be a problem if public sector becomes a major holder of IPRs in agriculture as till now public sector developed varieties are freely distributed to farmers and other material was also shared freely with other organizations. But now, with IPR regime, one should also keep in mind the farmers rights and their needs.
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13	How can the stakeholders be involved in this process of establishing IP regime both in India and internationally?	By regular meetings of stakeholders at all levels – regional, national and international. Creating database of traditional knowledge and products. Better partnerships between public sector and private sector organizations to share resources.
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