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# Making Indian Agriculture More Knowledge Intensive and Competitive: The Case of Intellectual Property Rights*

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Globalisation in trade and investment through harmonisation of national laws, particularly dealing with intellectual property rights is one of the major impacts of GATT/WTO. The contribution of knowledge as a factor of production is being increasingly given central importance in economic development. The management of knowledge not just in farms and firms but also in non-farm sector will become very crucial in the coming years. The intellectual property rights deal with the reciprocity in rights and responsibilities of inventors and society at large. In lieu of the disclosure of the patented innovation or invention, the society agrees to recognise the right of inventor to exclude others not authorised, from commercial exploitation of the invention. It is a kind of social contract between society and the inventor. Society gains by getting access to the inventive process and product, which can be used by other inventors for making improvements as well as developing substantive new innovations. Inventor benefits by having incentive to invest himself/herself or assign it to some one else interested in commercial exploitation of the invention. If others could easily copy the invention as often happens in the case of process patents, then investors will not make major investments and inventors will have no incentive to disclose. The plants and animals were kept out of the purview of patents when the concept was developed initially. However, in the fifties, discussion started on finding out ways in which more plant varieties could be developed and breeders could be given incentives to innovate and disclose the improvements.

The *sui generis* system created for protection of new varieties of plants by International Convention for Protection of New Varieties of Plants (UPOV) was a response to basically three factors (UPOV, 1998): (a) reluctance in the fifties to the application of patent systems to agriculture and to the plant breeding in particular, (b) realisation that a system was needed to protect plant varieties somehow to also safeguard the interests of the breeders. And (c) the conditions of patentability might not be appropriate for the plant varieties. Subsequently, the 1961 Act was modified in 1978 which was further modified in 1991. After ratification of 1991 Act by more than six countries, it has come into force now.

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This paper draws upon several of my earlier papers including the most recent ones entitled "Implications of WTO of Indian Agriculture: The Case of Intellectual Property Rights and Emerging Bio-safety Protocol", prepared as a part of joint research project report edited by S. Deodhar and S. Dutta, Centre for Management in Agriculture, IIMA submitted to Ministry of Agriculture, Government of India, New Delhi in 1999 and "Securing Traditional Knowledge and Contemporary Innovations: Can Global Trade Links Help Grassroots Innovations? Honey Bee Perspective", presented at World Trade Forum, University of Berne, Berne, August 1999.

I am extremely grateful to Ms. Shrabani Bose for providing invaluable help in the preparation of this paper, particularly the annexures based on the review of plant variety acts of more than 39 countries. The usual disclaimers apply.

I have had the opportunity to go through the latest plant variety bill that has received Cabinet approval. It has many unique provisions unavailable in plant variety bills of any other country. The comments based on a Ministry of Agriculture document summarising the plant variety bill are presented with the author's sole responsibility for any possible misrepresentation. I am grateful to Mr. Jain, Additional Secretary, Agriculture and his colleagues in Seed Division for extremely useful discussions. I also wish to put on record the extremely helpful discussions with Dr. Gautam, Director, NBPGR and his colleagues none of whom, however, needs to be blamed for any inadequacy in this draft.

While TRIPS (Trade-Related Aspects of Intellectual Property Rights) does not explicitly state that *sui generis* system should be compatible with the provisions of International Union of Plant Variety (UPOV), it is implied that such should be the case. Earlier, the option for the countries joining UPOV was to have their national laws compatible with UPOV 1978. However, after coming into force of UPOV 91, such an option does not exist for countries, which have not sent their draft bill to UPOV for reference. Although, this is a contentious issue. Many countries including India have argued that providing 'effective' plant variety protection through *sui generis* system need to mean parity with UPOV 91. Increasing use of biotechnology in producing transgenic crop varieties and genetically modified organisms (GMOs) also requires development of biosafety norms to regulate trade in such crops, animals and products. As much as 60 per cent of the marketed products in some commodities have biotechnological inputs in some of the developed countries. A significant part of it involves transgenic crops particularly in the U.S.A.

Indian government has not yet enacted either a *sui generis* system or a Plant Variety Act which is in conformity with WTO provisions. However, the author has had access to the new Plant Variety and Farmers' Rights Bill which is quite unique in many respects and has been summarised in the third part.

It is the author's contention that we cannot hope to make our agriculture self-reliant if the public sector agricultural research remains totally under the stranglehold of the government. It should have autonomy and be much more accountable to various user groups. Such will continue to be the case till R & D institutions primarily rely on government for funds. It is obvious that public sector R & D has played a very crucial role in agricultural growth in the country. The tragedy is that even well off beneficiaries of this growth did not share any part of their economic gains with the R & D institutions. So much so that the Central and State Seed Corporations never paid any revenue to the research institutes and universities. WTO implications will force agricultural R & D and trade sectors to become more efficient and competitive. Intellectual property rights protection for public and private sector scientists as well as institutions is likely to contribute to this process.

This paper deals with the experience of different countries which have enacted plant variety protection Acts and have tried to cope with biosafety norms as a consequence of increasing role of biotechnology in development and transfer of agricultural products, seeds, animal breeds. The lessons for Indian policy and options for future negotiations are mentioned in the end.

## I

## INTRODUCTION

The contribution of knowledge as a factor of production is beginning to acquire dominant role in the future trade, investment and technological change in agriculture as well as other sectors of the economy. The management of knowledge not just in farms and firms but also in non-farm sector will, thus, become crucial. But the production and reproduction of knowledge will no more be governed by the conventional norms of public space, scrutiny and substantive needs. It is the tension between public need and private control that will mount the first challenge. The conflict between chemical intensive agriculture (despite declining productivity of inputs) and the non-chemical sustainable technological innovations generated by the farmers as well as firms (national or international) will pose second

challenge. The increasing trend towards larger areas under fewer varieties and the need for food security through diversified biological systems will be the third source of conflicts.

The strategy proposed is aimed at making Indian agriculture and biodiversity based livelihood strategies of millions of disadvantaged communities and individuals not only globally more competitive but also domestically more progressive by using *knowledge* as a strategic resource. The major contention is that India should not view the challenges posed by WTO as if it will remain always an importing country and that it has no substantive intellectual property to offer to the world markets. The critical NGOs and other colleagues who criticise the concept of intellectual property rights have perhaps not been exposed to the inventive potential of Indian society. Honey Bee network has demonstrated over the last ten years through its data base having about ten thousand entries of innovations and outstanding examples of traditional knowledge, innovations and practices, the immense contribution that grassroots innovators can make towards this cause. Add to this the potential that Indian scientists have and one would know why TRIPS under WTO can indeed make R & D in formal and informal sectors as the pivot of socio-economic transformation of our society. It is true that India must negotiate changes in TRIPS to suit our requirements. But we can lobby for these changes because we are part of WTO.

## II

## TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS SYSTEM (TRIPS)

The Indian patent law is under review for bringing it in conformity with WTO provisions. A particular part of Article 27 mentioned below has direct implications for agriculture. Even the product patent aspect will have implications for agriculture by way of protection to the inventors of new agricultural products. Since processes are easy to copy, product patents are necessary.

The provision of TRIPS need to be strengthened to include (a) micro organisms but exclude life forms, b) registration system of grassroots innovations (unlike utility patent system, this registration system should be like product patent for ten years just as Australian innovation system has been proposed, (c) widespread patent search facility for educational and entrepreneurial networks and centres so that quality of research and education can be competitive, (d) just as a global registry has been proposed for wines under TRIPS, India must insist that similar global registry must exist for green small innovations too. This will help link innovation, investment and enterprise, each vector of which may be in different parts of the world. More on this aspect will be discussed later.

A review of clause (b) of para 3 of Article 27 of the TRIPS Agreement is due in the year 1999. This part of the Article states as under:-

"Members may also exclude from patentability:

(b) Plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the entry into force of the WTO Agreement."

Three permissible exceptions to the basic rule on patentability:

(i) inventions contrary to public order or morality. This explicitly includes inventions dangerous to human, animal or plant life or health or seriously prejudicial to the environment. The use of this exception is subject to the condition that the commercial exploitation of the invention must also be prevented and this prevention must be necessary for the protection of public order or morality.
(ii) diagnostic, therapeutic and surgical methods for the treatment of humans or animals.
(iii) plants and animals other than micro-organisms and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes: However, any country excluding plant varieties from patent protection must provide an effective *sui generis* system of protection.

The knowledge and activity of breeders is sought to be protected more vigorously. It has to do so by protecting the public sector research and development (much of which unfortunately has become weak over the years) but also create environment for promoting (a) farmer-led research, (b) farmer and scientist partnership in research, and (c) private and public sector collaboration in research.

The basic purpose of UPOV is to ensure national treatment for any breeder of the world at par with domestic breeders. The UPOV 1991 as the UPOV documents show (January, 1999), tries to achieve the following:

Article 14(1) (a) of the 1991 Act made the breeders' rights more precise. There is a view that inclusion of "conditioning for the purpose of propagation" does not extend the breeder's domain (since conditioning is just one step in the chain of developing propagation material) but instead makes his rights enforceable.

By extending the breeder's right under article 14(2) of 1991 ACT, UPOV 1991 act to harvested material where "breeder has not had enough opportunity to exercise his right in relation to the propagating material" (1999). Infringement in some cases may become apparent only when the harvested produce comes into market though one has to prevent absence of diligence in prior scrutiny and objection. It also means that import of harvested material can also be protected both by way of collection of royalty and safeguarding the interests of national licensed producers.

The provision of compulsory licensing can of course be invoked in the event of special national interests.

Farmers' privileges can be protected in terms of rights to save seed, exchange it for non commercial purposes.

The issue here is that Indian breeders will need all these protections in other countries. The mind set where we evaluate every thing from an importers' perspective must change.

### *Key Objections to Stronger IPR Regime along with a Case for Stronger IPR Regime* (Gupta, 1996[1], 1999)

The debate on the relevance and appropriateness of the conventional IPR regime for plant varieties, products based on knowledge of local communities and individual informal experts and use of local biodiversity even without use of associated knowledge systems has become very emotive in recent years. Many NGOs and activists see no merit in the IPRs regime for providing incentives to local communities and creative individuals. They term the attempts of the large corporations (generally MNCs) to access biodiversity without sharing any benefits with local communities as 'Biopiracy'. Many others oppose the IPRs because these

are supposed to commoditise knowledge which reportedly was 'always' in the common domain for universal/local benefit. High costs of hiring patent attorneys is supposed to make the present patent system out of reach of grassroots innovators. The absence of any institutional set-up in most developing countries to (a) provide information about IPRs, (b) extend help to obtain patents for individuals or communities and (c) oppose the patents by others on the knowledge traditionally known to local communities, has further alienated the moderates and hardened the attitudes of the conventional opponents.

The arguments of those who do not see any hope in the provisions of TRIPS can be summarised as:

(a) All the knowledge held by people about the use of biodiversity for treating various ailments of human and animals, producing vegetative dyes, developing local land races, etc., is held in common by the local communities. This knowledge is supposed to have been transferred by one generation to another over a very long period of time with (or without) some value addition by successive generations.

(b) The knowledge must be held in common domain and should not be allowed to be monopolised by MNCs (though the behaviour of public sector and private but national drug companies is no different from the MNCs).

(c) Intellectual property right regime evolved for protecting industrial designs and processes and is not suitable for biological processes and products.

(d) Since the knowledge of various plants has been developed over several generations, why should the present generation be entitled to reap all the rewards, if any?

(e) Why should governments be entitled to any benefits from the commercialisation of patented products when the resource and the knowledge were actually provided by the individuals or communities?

(f) While process patents can be provided, the product patents impede research, generate excessive monopoly to one or few inventors, make the technology or products out of reach of the common people due to price increase, and discourage expertise of successful reverse engineering in the third world.

There are many other arguments on ethical and efficiency grounds against the patenting of life forms and also against the products derived from common knowledge without any reciprocity towards knowledge generators or providers in one or more countries in the region.

I propose to dispel many of these myths, acknowledge where there is a genuine case for reforms of patent regime and finally suggest an alternative framework which may be needed to help achieve the goals of IPRs, i.e., rewarding inventive and creative activities in society. It is acknowledged that encouragement to creative and innovative spirit at grassroots level will not be possible only through IPR regimes. It is for this reason, Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) and Honey Bee network have been arguing since 1989 that various models of reward involving material and non-material incentives for individual and communities applicable in the short and long term should be explored. One of the material-individual way of rewarding creativity can be patenting. Other such forms of protection of intellectual property (Gupta, 1989, 1990, 1991, 1995, Honey Bee,1989-95) could be honoraria and awards to individuals. But this is just one way. There could be trust funds for helping groups, insurance, or venture funds, etc., which are monetary but collective instruments of incentives. Likewise, non-monetary

honour, naming streets after eminent conservers, hanging portraits of innovators in prominent places, can be non-monetary but individual incentives. The pedagogical changes, policy and institutional changes are non-monetary but collective incentives.

My Case:

1. Not all the knowledge held by people in biodiversity rich economically poor regions and communities is (a) traditional, (b) carried forward in fossilised form from one generation to another but has been improvised by successive generations, (c) collective in nature, and (d) even if known to communities, is reproduced by everybody.

2. Considerable knowledge of economic importance is produced, reproduced, and improvised by individuals and also in recent times, i.e., through contemporary innovations.

3. Even the traditional knowledge should receive certain kind of protection if incentives have to be generated to conserve not only the knowledge but also the institutions of its reproduction and inter-generational transfer. We should not kill the goose, which laid the golden eggs so long.

4. Given the high hit rate in formal research around locally identified uses of plants and other kinds of biodiversity, transaction costs of formal R & D systems in private and public systems are reduced considerably. They should in turn share the benefits that may accrue from commercialisation of such protected products. In some cases local communities or individuals as the case may be should be considered co-inventors of the new value added products.

We have made this unpopular argument for the last several years through the columns of Honey Bee newsletter and otherwise, that governments in developing countries should not discriminate among national and international companies/organisations regarding (a) threat to environment from unrestrained exploitation of germplasm or biodiversity without replacing or repairing disturbance to natural habitats, (b) exploitation of local or traditional or contemporary knowledge of people without prior informed consent, and ensuring equitable sharing of benefits, and (c) contribution to national capacity building in negotiating fair and reasonable contracts among people and the biodiversity prospectors. What solace does it give to the poor biodiversity conserving community that in some cases it is exploited by national companies and not a MNC?

Some exceptions may be made in the case of those NGOs or civil society organisations which are explicitly accountable to people and are experimenting to evolve models of rewarding creativity through material and non-material incentives for individuals and communities.

5. The newness and non-obviousness of a traditional knowledge should be seen in the light of available repertoire for that particular purpose.

6. The local knowledge should qualify to be considered new for the purposes of prior art since outside communities/companies may not have had access otherwise. The norms regarding exhaustion of the rights due to publication of local knowledge should be reconsidered and modified so that incentives to share the knowledge by local communities with outsiders are not affected adversely.

7. The argument that all the knowledge should be treated as common property is not tenable because large number of local experts we have met so far are extremely knowledgeable though very poor. They know far more than anybody else in the village and have expertise to prepare various solutions. Others may know about it but they may not have contributed to it except by giving an opportunity for testing. To that extent they should have a small share in the entitlements. But the entitlements of an expert could not be at par with the rest of the community. Local communities have not provided them any significant incentives such that either their children or other younger people try to learn their skills.

It should also be noted that secrecy is not a gift of modern patent regime. Lots of traditional knowledge has already been lost or is in the process of being lost because the expert concerned did not ever share the innovation with any one.

8. Every patent office in a western country should insist that patent applicant declares that the knowledge and resources used in a patent have been obtained lawfully and rightfully.

This implies the need for regulations in developed countries requiring full disclosure by any corporation or an individual seeking patent protection on a plant based drug or any other natural product. The disclosure should provide that the source material has been *rightfully* and *lawfully* acquired. 'Rightful' acquisition would involve moral as well as ethical issues in access to biodiversity. For instance even if a local community has not asked for any price for sharing the material or the knowledge about it, is the corporation bound by an ethical conduct to set up trust funds and other forms of reciprocity for local communities? Is it incumbent upon it to ensure that the superior ethics of local communities remaining poor despite conserving biological diversity and the knowledge around it does not become a reason for perpetuating their poverty, and thus endangering the survival of diversity itself?

The 'lawful' acquisition will imply that prior informed consent and approval and involvement of local communities and creative individuals has been ensured provided that the biodiversity donor country has laws requiring such a consent and approval. If a country does not have any such laws, as for instance India, then acquiring any material will be lawful or legal but may not be rightful.[2]

9. The publication of local knowledge deprives on the one hand any benefit that may arise from value addition in local knowledge to the individual or community or nation concerned and on the other, makes it possible for people struggling with similar problem to learn from it. This happens through publication in local languages as attempted by Honey Bee. However, the challenge is to marry two goals of easy and quick opportunity for lateral learning (through local language publication) and sharing of benefits through value addition in the same knowledge. A quick legitimacy to Data Bases like Honey Bee and registration system of innovations as proposed in the next point below may provide the answer. Honey Bee will then make its data bases accessible to all patent offices in lieu of the protection provided to the communities and individuals whose knowledge is catalogued in it. The alternative of greater secrecy and withholding of knowledge will make every one loser through (a) greater erosion of oral knowledge, (b) continued unwillingness of younger generation to learn the knowledge, innovations and practices developed over a long period of time, (c) depriving any opportunity to knowledge holders as well as those dependent upon them to improve their livelihood prospects through sharing of possible benefits, (d) lack of material incentives for conservation of endangered species, (e) knowledge-rich poor communities may migrate out due to low opportunities for subsistence and employment and may not take care of the

local resource or over-exploit the resource itself netting very little value in a short period of time, and (f) stifling the very creative and buoyant laboratory of innovations at grassroots by denying any social esteem for such knowledge through material as well as non-material incentives and general neglect.

10. Since it will be very difficult for any and every community to seek protection of its knowledge and inventive recipes for various purposes such as herbal pesticides, human or veterinary medicines, vegetative dyes, etc., a registration system should be developed as explained below:

SRISTI and Honey Bee network have been pleading for a global system of registration (SRISTI, 1993) for grassroots innovations such as INSTAR (International Network for Sustainable Technological Applications and Registration) and Honey Bee data base has more than about 10,000 innovations with name and addresses of the innovative/creative communities and/or individuals along with the name of the communicators through whom we have learned these innovations.

Such a registry will prevent any firm or individual to seek patent on community knowledge as well as on knowledge and innovations produced by individuals without some kind of cross licensing.

It will be possible to achieve the following results from such a registry:

(i) Acknowledgement of individual and collective creativity

(ii) Grant entitlements to grassroots innovators for receiving a share of any returns that may arise from commercial applications of their knowledge, innovations or practices with or without value addition. Also entitle them to secondary entitlements such as priority in certain public amenities, privileged access to certain kind of information and resources for value addition in their knowledge systems.

(iii) Linking the golden triangle of entrepreneurship by linking investments, enterprise and innovations (Gupta, 1998). Small scale investors in North and South cannot afford to go to various countries, scan diversity of knowledge and resources, negotiate contracts and invest up front huge investments for value addition. If they do not participate, then the field will remain dominated by only large corporations. This register will help small scale investors to seek opportunities of communication with communities and individual innovators and explore opportunities of investment. A large number of potential negotiations will take place increasing the opportunities for innovative communities and individuals. The competition among the investors tempered by competition among potential suppliers of a various kinds of knowledge as well as diversity will moderate expectations on both the sides.

(iv) An autonomous authority of which local community representatives will also be the members could be entrusted with the responsibilities of having access to all the contracts. A copy of the contracts may have to be deposited with this authority so as to avoid short changing of the communities. These contracts will also be scrutinised to see whether the management plans for sustainable extraction of diversity have been drawn upon in scientifically appropriate manner or not. Penalties may have to be imposed for non-sustainable extraction of herbs from wild as well as domesticated environments by domestic as well as external extractors.

(v) Each entry in the Register will be coded according to an universal system like ISBN. The postal pin code of the habitat of the community or individuals registering innovations will be incorporated in the indexation system so that geo-referencing of innovations can be done. In due course the contextual information of innovations can also be incorporated in the system so that this system of innovations can help cross connect the communities having similar ecological situations or facing similar constraints or challenges.

(vi) The entry in the register will in the first stage be mere acknowledgement of creativity and innovation at grassroots level. But later some of the innovations will be considered appropriate for award of inventors certificate or a kind of innovation patent which is a limited purpose, limited claims (say 5-7) and limited duration (7-10 years) protection. An essential purpose of this innovation also is to enable the potential investors (a co-operative of consumers, producers, an entrepreneur, or a large firm in private or public sector) to get in touch with innovators to set up enterprises.

(vii) The award of certificae will also increase entitlement of innovator/s for access to concessional credit and risk cover so that the transition from collector, or producer of herbs or cultivator of local land races to developer and marketeer of value added products can take place in cases where the innovators deem that fit.

(viii) The registration system will also be part of Knowledge Network linking problem solving people across the world at grassroots level (see discussion on Knowledge Network in the later section). This will promote people to people learning and serve as a multi-language, multi-level, multi-media (oral, textual, electronic) clearing house for local and indigenous communities.[3] Wherever necessary and possible, formal scientific institutions will be linked up in the network.

Apart from the registration system a large number of specific incentives would need to be developed for different categories of knowledge, innovations and practices. Similarly, the incentives for preservation of sustainable lifestyles of indigenous communities would also be different.

We realise that most governments in the developing countries do not have resources even to pay salaries of public administrators, to expect them to provide benefits to conservators of diversity and developers of innovations is not a realistic goal. If private or public or co-operative sector has to share the benefits, they should obviously make profits. IPRs do play a significant role in generating these profits. However, very broad patents like the one in the case of transgenic cotton (which was later rescinded) are neither in the interest of science nor business efficiency in the long term.

So far as sustainable technologies are concerned such as herbal pesticides, growth regulators, vegetative dyes, etc., South can provide technologies to North. But if such innovations are used without appropriate reciprocities, then the knowledge systems which produced these innovations will not last very long. It is true that poor people in the third world may be creative and innovative but they cannot afford costly attorneys. A system has to be evolved to provide this help through public interest institutions or initiatives. Inventor assistance programmes or Incubators like the ones tried by Franklin Law Pierce Centre, U.S.A., being set up at Indian Institute of Management, Ahmedabad or IIT, New Delhi, etc., should be tried out at the global scale and in many countries immediately.

The patentees in the case of innovations like the ones based on neem[4] trees should agree

to share part of their profits with an International innovations support and biodiversity conservation fund. After all, they did not stumble upon neem tree-based knowledge randomly. The contribution of local communities in several countries made the innovation possible.

In this section a case has been made for adapting patent systems not only to accommodate the creative urges of local communities but also to ensure that this vibrant and dynamic laboratory for developing sustainable technologies and products does not die down just because a community of IPR experts could not fathom its long-term potential.

## III

### HONEY BEE NETWORK TRANSFORMS PARADIGM OF BENEFIT SHARING: THE CASE OF MONETARY AND NON-MONETARY INCENTIVES FOR COMMUNITIES AND INNOVATORS

Honey Bee Network evolved ten years ago in response to an extraordinary discomfort with my own conduct and professional accountability towards those whose knowledge I had written about and benefited from. I realised that my conduct was no different from other exploiters of rural disadvantaged people such as moneylenders, landlords, traders, etc. They exploited the poor in the respective resource markets and I exploited the people in the idea market. Most of my work had remained in English and thus was accessible to only those who knew this language. While I did share findings of my research always with the providers of knowledge through informal meetings and workshops, the fact remained that I sought legitimacy for my work primarily through publications and that too in English and in international journals or books. The income which had accrued to me had not been shared explicitly with the providers of the knowledge. I had argued with myself that I have spent so much time and energy in policy advocacy on behalf of the knowledge-rich, economically poor people. But all this was of no avail when it came to being at peace with oneself. That is when the idea of Honey Bee came to mind.

Honey Bee is a metaphor indicating ethical as well as professional values which most of us seldom profess or practice. A honey bee does two things which we, intellectuals often don't do: (i) it collects pollen from the flowers and flowers don't complain, and (ii) it connects flower to flower through pollination. Apart from making honey of course. When we collect knowledge of the farmers or indigenous people, I am not sure whether they don't complain. Similarly, by communicating only in English or French, or a similar global language, there is no way we can enable people to people communication. In the Honey Bee network, we have decided to correct both the biases. We always acknowledge their innovations by their names and addresses and ensure a fair and reasonable share of benefits arising out of the knowledge or value addition in the same. Similarly, we also have insisted that this knowledge be shared in local languages so that people to people communication and learning can take place. Global trade so far has not created enough space for such knowledge to be exchanged among people in different continents which reduces their transaction costs of learning from each other around particularly non-monetary green technological innovations.

Honey Bee, in that sense, is like a Knowledge Centre/Network which pools the solutions developed by people across the world in different sectors and links, not just the people, but also the formal and informal science. It is obvious that people cannot find solutions for all problems. At the same time, the solutions they find need not always be optimal. *There*

*remains a scope for value addition and improvement in efficiency and effectiveness. But it is definite that a strategy of development, which does not build upon on what people know, and excel in, cannot be ethically very sound and professionally very accountable or efficient.*

Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) has set up an internal fund to honour ten to fifteen innovators every year from its own resources supplemented by the license fee received from a company to whom three herbal veterinary drugs were transferred based on public domain traditional knowledge. Similarly, patents have been filed or are being filed on behalf of several innovators. In the case of tilting bullock cart developed by Amrut Bhai of Pikhore village, while the patent is pending, the technology has been licensed to private entrepreneurs for three districts of Gujarat for an attractive financial consideration. This amount has been given to the Amrut Bhai through Gujarat Grassroots Innovation Augmentation Network (GIAN). GIAN itself was set up in 1997 as a follow-up of International Conference on Creativity and Innovation at Grassroots held at the Indian Institute of Management, Ahmedabad (IIMA) in collaboration with Gujarat Government to scale up and commercialise grassroots innovations. The golden triangle linking innovation, investment and enterprise, which I first talked about at AIPPI forum, organised three years ago has now been operationalised. SRISTI had pursued this linkage through its venture promotion fund before GIAN came into being. Even after that, it continues to provide financial support for action research to small innovators. Whether global linkages among innovators in one country with investment and enterprise in second and third country take place, is only a matter of time.

*Alternatives to Development: From Grassroots to Global*

SRISTI, a global NGO set up a few years ago, provides organisational support to the Honey Bee network around the world. It is a network of odd ball who experiment and do things differently. Many of them end up solving the problem in a very creative and innovative manner. But the unusual thing about these innovations is that they remain localised sometimes unknown to other farmers in the same village. Lack of diffusion cannot be considered a reflection on the validity of these innovations. The innovations could be technological, socio-cultural, institutional and educational in nature contributing to the conservation of local resources and generation of additional income or reduction or prevention of possible losses. Farmers have developed unique solutions for controlling pests or diseases in crops and livestock, conserving soil and water, improving farm implements, various kinds of bullock or camel carts for performing farm operations, storing grains, conserving land races and local breeds of livestock, conserving aquatic and terrestrial biodiversity, etc.

Honey Bee has already collected more than ten thousand innovative practices predominantly from rainfed regions to prove that disadvantaged people may lack financial and economic resources, but are very rich in knowledge resource. That is the reason we consider the term 'resource poor farmer' as one of the most inappropriate and demeaning term in current usage. If knowledge is a resource and if some people are rich in this knowledge, *why should they be called resource poor* (a term used in GATT/WTO also) ? At the same time, we realise that the market may not be pricing peoples' knowledge properly today. It should be remembered that out of 114 plant derived drugs, more than 70 per cent are used for the same purpose for which the native people discovered their use (Farnsworth, 1988).

This proves that basic research linking a material and effect had been done successfully by the people in a majority of cases. Modern science and technology could supplement the efforts of the people, improve the efficiency of the extraction of the active ingredient, find causal mechanism, or synthesise analog of the same, thereby improving their effectiveness.

The scope for linking scientific search by the scientists and the farmers is enormous. We are beginning to realise that peoples knowledge system need not always be considered informal just because the rules of the formal system fail to explain innovations in another system. The soil classification system developed by the people is far more complex and comprehensive than the USDA classification systems. Likewise, the hazards of pesticides residues and associated adverse effects on the human as well as entire ecological system are well known. Some of these practices could extend the frontiers of science. For instance, some farmers cut thirty to forty days old sorghum plants or Calotropis plants and put these in the irrigation channel so as to control or minimise termite attack in light dry soils. Perhaps hydrocyanide present in sorghum and similar other toxic elements in Calotropis contributed towards this effect. There are a large number of other plants of pesticidal importance found in arid and semi arid regions, hill areas and flood-prone regions which can provide sustainable alternatives to highly toxic chemical pesticides.

It is possible that private corporations may not have much interest in the development and diffusion of such alternatives which pass control of knowledge into the hands of people. However, an informed, educated and experimenting client always spurs better market innovations as is evident from the experience of computer industry. *Therefore, we do not see a basic contradiction between the knowledge systems of people and the evolution of market rules to strengthen and build upon it. However, such a model of market would be highly decentralised, competitive, open and participative.*

Honey Bee in that sense is an effort to mould markets of ideas and innovations but in favour of sustainable development of high risk environments. The key objectives of SRISTI thus are to strengthen the capacity of grassroots level innovators and inventors engaged in conserving biodiversity (a) to protect their intellectual property rights, (b) to experiment to add value to their knowledge, (c) to evolve entrepreneurial ability to generate returns from this knowledge and (d) to enrich their cultural and institutional basis of dealing with nature.

Of course, no long-term change in the field of sustainable natural resource management can be achieved if the local children do not develop values and a worldview which is in line with the sustainable lifestyle. Thus education programs and activities are essential to perpetuating reform.

## IV

## POLICY ISSUES

Some of the policy issues that need to be addressed in future are:

(a) The rights of local communities and farmer breeders in land races as well as recent improvements in these land races, could be a major source of stability in food supply in the wake of fluctuating climate and other environmental conditions. The incentives for decentralised breeding by farmers on their own, with or without partnership of scientists, will help make the goal of generating diversity in genetic base a realisable goal. A registration system of land races will have to be developed to recognise the

community rights in these races. Indian Plant Variety and Farmers' Rights Bill (henceforth, Indian PFRB) makes a very bold attempt in this direction which has not been tried by any other country whose PVP bills has been reviewed here.

(b) Monetary as well as non-monetary incentives for individuals as well as communities as advocated by Honey Bee network and SRISTI for the last ten years are essential if the asymmetry in the rights of institutional and informal breeders has to be reduced and eventually eliminated. Without wider participation in production of intellectual property such as plant varieties, a diverse country of India's size can not grow in a sustainable manner in future. France offers an interesting model in which small farmers' co-operatives dominate the seed industry instead of large multinational corporations. The preference for taste by consumers can be harnessed for promoting decentralised co-operative and small scale entrepreneur-based seed industry. The public sector research institutions will have to provide hand-holding support to such co-operatives and entrepreneurs. There is no policy for encouraging small scale breeders. Recently when a farmer bred a variety of groundnut, 'morla' (developed by Thakarshee Bhai) was taken up by ICAR's All India Coordinated Research Project (AICRP) on groundnut, the NGO SRISTI had to arrange the seed required for multi-location trials. Despite good intentions, the scientists concerned had no provision to pay for seeds of such small farmer breeders. This incidentally was the first time in the last fifty years that a farmer-bred variety had been taken up for all-India trials. Such cases must multiply and soon.

(c) There must be a registration system for encouraging protection of local land races and incentive system must be generated for *in situ* conservation. Ten per cent of the area under threatened land races may receive incentive price computed by productivity multiplied by price to equal similar productivity price equivalent of modern variety in that area. Thus a farmer selected through random lottery will be eligible for such an incentive only if he/she had grown land race. A national register must also be developed for other herbal innovations. The Indian PFRB provides for registration of not only extant varieties but also farmers land races by communities or NGOs.

(d) National data base on local varieties with systematic documentation of local knowledge of women and men is very necessary. For making our breeding system responsive to global demands, we must know which land races can offer genes for which kind of characters. Only agronomic evaluation is not sufficient. The local knowledge of farmers' families is very valuable but almost completely absent from passport sheets of *ex situ* gene banks. This is a task which will pay dividend quickly if given high level of attention.

(e) We have to create a Knowledge Network, which will connect creative farmers, scientists and policy makers in real time so that macro policy can be responsive to micro level innovations, and other urges.

(f) Sustainable Technologies: The Honey Bee data base demonstrates that productivity can be increased without impairing the environment and quality of outputs. Our exports are getting affected in some of the sectors by pesticides residues. National

technology mission on non chemical technology development is a must and this should not restrict its scope to innovations by formal centres of research alone. Informal innovations should also get the same attention.

(g) Demand for *organic food* and spices is increasing world over but we still do not have decentralised arrangements for certification by NGOs, and public sector research organisations (exceptions apart).

(h) We have to strengthen *phytosanitary control systems* to prevent import of diseases, pests, weeds, etc., in the wake of liberalised import of seeds material from abroad. Training of customs officials in this regard is necessary. They should also be trained to prevent clandestine export of restricted seed material out of the country. The export of soil samples without proper authorisation should also be prevented since patents already exist on micro organisms taken from soil from Gujarat and many other regions of the country.

## V

## HIGHLIGHTS OF INDIAN PLANT VARIETY AND FARMERS' RIGHTS BILL, 1999

Indian Government is yet to enact a plant variety Act but the draft has already gone through vetting by inter-ministerial group and represents one of the most progressive documents. There are many features in this draft bill which none of the 39 country plant variety Acts had.

(a) Indian Government has preferred to use *sui generis* system instead of patents because of three major advantages: flexibility, better protection of farmers' rights, and stronger researchers' exemption.

(b) The Indian Draft Bill on Plant Variety and Farmers' Rights provides for the option of compulsory licensing when reasonable quantity of seed or reproductive material of protected variety is not made available in the country.

(c) Government has the power to determine which genera and species would be covered under the Plant Variety Protection.

(d) In case of any disputes regarding orders of Indian PVFRB Authority, the high courts will have the jurisdiction for resolving any complaints.

(e) Clause 25 of the Bill has a provision for non-registration of the varieties which are injurious to the public morality or health as in the case of 'terminator gene'.

(f) There is a provision of setting up gene fund, which will determine the share of benefits to be given to farmers or other breeders and also decide the eligibility for getting benefits, whether benefits are given one time or on recurrent basis.

(g) There is a provision for registration of extant varieties, i.e., the ones notified under Seed Act, 1966 released by the Central Seed Committee. The provision also exists for preservation jointly or severally of wild species or a traditional variety with or without added value and which has economic use.

(h) The farmers' rights include the right to (i) produce his crop, (ii) use product of crop as seeds for producing further crop and (iii) selling product of crop except its sale exposing it as a seed.

(i) The new varieties are supposed to be those varieties, which have not been grown earlier than one year outside India and in the case of trees and vines not earlier than six years. In all other cases, the limit is four years.

(j) The distinctiveness of the variety is defined by its distinguishability by at least one essential characteristic from any other variety whose existence is a matter of common knowledge in any country at the time of filing of application. Failure of an application for the grant of breeder's right to a new variety or its derivatives shall be deemed to render that variety as a matter of common knowledge.

(k) The applicant is required to provide complete passport data of the parent line from which new variety or its propagating material has been developed.

(l) The duration of protection is 18 years for trees and vines and 15 years in the case of extant varieties and 15 years for other crops except extant varieties in which 15 years will be calculated from the date of notification by the government under the Seed Act, 1966 or from the date of release or date of registration as a farmer's variety whichever is earlier.

(m) Gene Fund: Breeder will deposit in gene fund the amount determined by the authority. In case of default, this amount can be recovered as arrears of land revenue.

(n) The breeder will be required to deposit appropriate quantity of the propagating material.

(o) Researcher's Right: Authorisation of breeder or plant variety protection holder is necessary when repeated use of parental lines of a variety is required. Otherwise nothing will prevent any researcher from using a protected variety as a research material.

(p) Farmer's Right: Farmers have the right to save, use, exchange, share or sell their farm produce of a protected variety except when covered by contractual market arrangement.

(q) Rights of communities: People of any community or an NGO representing them can represent the contribution of people to a variety granted protection under the Act. The authority would verify such claims. And if found valid, compensation would be paid to NGO/people who submit claims of people against which existing breeder/s enjoying protection would be heard and given notice. The compensation granted by the breeder will be deposited in the gene fund. The NGO or the community shall withdraw the compensation even if such a fund has not been deposited by the breeder concerned in the gene fund. The compensation shall be recovered from the breeder in case of default as arrears of land revenue.

(r) National Gene Fund: The functions of national gene fund are: (i) benefits sharing in the prescribed manner, (ii) royalty paid at such rate as may be prescribed by the Central Government on the sale price of the seed or propagating material of a registered variety and (iii) contribution from national or international organisations can be received in the gene fund.

(s) All plants under the order Plantae are included for protection except micro organisms.

As mentioned earlier, the Indian PVFRB has many unique features such as opportunity for registration of extant varieties, registration of farmers' traditional varieties by communities of NGOs on their behalf, constitution of National Gene Fund though it aims to collect revenue mainly from seed companies only - a point that we will like to critique. If we look at the provision for UPOV 1978 and 1991 (Table 1), we will notice that Indian PVFRB has most provisions of UPOV 1978 but some provisions of 1991 also.

TABLE 1. PROVISIONS IN THE UPOV 1978 AND 1991 ACTS

| Provision (1) | UPOV 1978 Act (2) | UPOV 1991 Act (3) | Patent Law (4) |
|---|---|---|---|
| Protection coverage | As many plant genera and species 'as possible'. Minimum of 5 on joining and of 24 after 8 years | Minimum of 5 on joining. 10 years later, must protect all plant genera and species | Inventions |
| Requirement | Novelty (variety must not have been commercialised) Distinctness, Sufficient Uniformity having regard to the particular features of variety's propagation, Stability | Novelty (variety must not have been commercialised) Distinctness, Sufficient Uniformity having regard to the particular features of variety's propagation, Stability | Novelty (Invention must not have been published) Non-obviousness (inventiveness), Industrial applicability (usefulness) |
| Protection term | Minimum 15 years (18 years for trees and vines) | Minimum 20 years (25 years for trees and vines) | Minimum 20 years (TRIPS) |
| Protection scope | Production for commercial purposes and offering for sale and marketing of propagating material of the variety | Commercial transactions with propagating material. Harvested material protected only if produced from propagating material without breeder's permission and if breeder had no reasonable chance to exploit his right over it | Making, using, selling patented product; usung patented process |
| Breeders' exemption | Yes | Yes. *Essentially derived* varieties can only be marketed with the agreement of the breeder | No |
| Farmers' privilege | Minimum scope of protection allows a farmer's privilege | Each Member State can define a farmer's privilege suitable for its conditions | No |
| Prohibition of double protection | Any species eligible for PBR protection cannot be patented | The Act is silent on this question; countries may choose to exclude plant varieties from patent protection | Many countries exclude plant varieties as such, from patent protection |

*Source:* Original table in van Wijk *et al.* (1993, p. 8), updated by UPOV Secretariat.

## VI

## FINDINGS AND RECOMMENDATIONS FOR CHANGE

1. *Definition of variety:* A variety must fulfil three criteria to be called as a particular variety: (a) it should be possible to describe the member plants through a common descriptor, (b) a distinguishing feature or features by which one can distinguish one variety from another criteria, i.e., distinctiveness, uniformity, and stability (DUS) corresponding to point 'b', 'a' and 'c' respectively mentioned above. The requirement of DUS prevents buffering population of land races, heterogeneous in nature to be protected. One way to circumvent this constraint will be to require the condition of stability be met over four or five generations rather than in every generation. Multi-line

varieties developed for rainfed regions would have to have the capability to deal with too much rain or too little, likewise early rain versus little delayed. The definition of uniformity and stability would thus require modification. The narrowness of genetic base has already been recognised as a major threat to food security in most countries. The DUS conditions will only make the situation worse. The definition of the plant also varies a great deal from country to country. Australia includes in **'plant'** all fungi and algae but does not include bacteria, bacteroids, mycroplasmas, viruses, viroids and bacteriophages. Whereas New Zealand includes fungus but excludes alga or bacterium. India will have to decide the spectrum of protection it needs to provide. In my view, it is better to accept Australian definition since it is closer to the accepted scientific perspective.

2. The inclusion of '*discovered wild plants*' in the definition of variety by China, and France which can be protected provided these had DUS property, offers an interesting possibility. This implies that a wild plant, which has just been characterised as DUS such as medicinal, plants, or even crop or horticultural plants can be covered under protection and entitle one to breeder's privileges. This is akin to the privilege provided in the patent act for microbial organisms found in nature but isolated and characterised to become eligible for protection. The exclusion norms for product of nature stand thus modified. The issues are more pragmatic than moral because domestication process in the long past had generated the land races in the first place. Similar domestication must continue now to meet future food needs and reduce dependence on a very narrow range of food crops as at present. Whether such an activity should be rewarded or not is an issue to be decided. If it is rewarded, it is likely to take place more aggressively, otherwise it might suffer. I have no doubt that only monetary rewards are not the most potent force in generating human motivation for a desired action. However, it is also true local communities and individual farmers only should not be expected to contribute on voluntary basis when every other section of society clamours for monetary gains.
3. Just as the rights of those breeders who make selections in the locally existing agro-biodiversity are protected under the UPOV Convention, the rights of the farmers who have bred and selected the local land races should also be protected. FAO undertaking on Farmers' Rights has been on the table for more than a decade without any funds flowing into the kitty. One reason could have been that no developing country has cared to establish such funds even nationally. The argument cannot be that only the international (read western) corporations or institutions need to pay into this or any other such fund while the seed companies and beneficiaries of green revolution in developing countries need to have no reciprocity towards the conservators of land races. I have argued that a one to two per cent cess on the transactions in market yards in green revolution regions and cash crops should be used for generating funds for conservation and recognition of farmer's varieties. This fund can also be used for providing incentive price to ten per cent of the conservators of land races selected through a lottery every year. This price can be determined by finding out the difference between the price and yield of a land race and a high-yielding variety suitable for the local area. Since only those farmers will be eligible to participate in the scheme who have grown land races, the leakage of the benefits can be avoided. This scheme can be started for those land races which are under threat of extinction. This will promote *in situ* conservation and

also provide incentives for agro-biodiversity to be maintained. The cost of the seed should not increase (as it is likely to under current arrangement) such that already low replacement ratios further decline. Seed industry should certainly be required to make contribution to gene fund for *ex situ* conservation and to some extent for *in situ* conservation. However, the major contribution should be through the imposition of a small cess of fifty paise per quintal on market arrivals in green revolution high growth districts as well as on export from these regions. This cess fund should be used exclusively through Gene Fund for providing incentives to small farmers growing land races in marginal environments.

4. The public sector and private sector R & D institutions should also be encouraged to set up their own Gene Funds from the royalties of the varieties licensed by them to the seed companies. The brand equity of public sector R & D institutions should be protected through trademark protection and royalties on the same should be charged, for instance, to every user of 'Pusa' brand name. Public sector R&D institutions should be encouraged to set up joint sector companies with equity participation from the workers, scientists and other investors. The protection of intellectual property rights will require appropriate institutional innovations for enforcing the same. Without such a protection, they will not be able to set up corporate gene funds.
5. The coverage of protection under UPOV 1978 Act was minimum of five plant genera or species after joining and twenty-four after eight years. In UPOV 1991 a minimum of five on joining and must protect all genera and species after ten years. India may have to consider a middle ground. The basic purpose of including any genera or species is to recognise and promote the research and development in that species. It is always possible for a country to refuse protection to any variety if it violates moral order or public safety.
6. Another extension under the breeders' right provided in the UPOV 1991 is under Article 14(2) to cover harvested material. Thus if a breeder has not exercised his rights to propagating material or a standing crop, his rights don't cease to operate once the crop is harvested. This makes sense from the point of view of enforcement of breeders' rights on domestic and imported harvested material. Therefore, if somebody grows seed of a particular protected variety seed outside the country and then imports that seed, he will still be obliged to take the permission of the breeder and/or pay royalty to him.
7. The farmers' privileges are left to the discretion of each country. Whether farmers can be allowed to produce seed for use on their own farm in the next growing season is a subject that is covered by Article 15(2) which requires the rights of the farmers to be, "within reasonable limits and subject to the safeguarding of the legitimate interest of the breeder". To all farmers having holdings less than 20 or 30 hectares, the privilege must extend without any restriction. However, holdings larger than that also may not be required to pay royalty to the breeder for sale of seed across the fence without using brand name. In the Plant Variety Act of Zimbabwe, there is a provision that a farmer cultivating less than ten hectares of land will not infringe the breeder's right if he used the saved seed from previous cycle of protected variety for propagating purposes on the said land or if he has modified the variety to be called as essentially derived variety. By implication, farmers having larger holdings will not have this privilege. The Plant Variety Act of Venezuela provides for "farmers privileges" in Article 26, "anyone who stores and sows for his own use, or sells as a raw material or food, the product of his cultivation

of the protected variety shall not be thereby infringing the breeder's right. This Article shall not apply to the commercial use of multiplication, reproductive or propagating material, including whole plants and parts of plants of fruit, ornamental and forest species". The proposed Indian Bill permits farmers to retain, exchange and sell seed without using brand name but without any quantity restrictions. This will permit the large estates and big commercial farmers to escape the responsibility of sharing the royalty with the breeder. Alternatively the seed companies may increase the price of the seed to recover their costs within one cycle of sale and in the process exclude small growers from the access to seed. Still another implication could be that private seed companies might not invest resources for improving self-pollinated crops because of the above constraints. A society has to decide whether the privileges to all classes and in equal measure will promote the long-term interest of productivity and incentives for R & D.

8. To prevent biotechnologically produced varieties to take away the benefits of conventionally bred varieties by transferring one or a few genes into or from the same, the concept of essentially derived varieties (EDVs) has been developed. However, EDV does not deal with incorporation of gene from a protected variety into an unprotected variety. The fact that conventional breeding by farmers or plant breeders made the expression of a particular critical gene possible has to be recognised. Therefore, the claimant for plant variety protection for a biotechnologically produced variety should disclose the source parents and must agree to contribute part of the gain with the breeders of the source variety.
9. Under the UPOV 1991 a provisional protection is mandatory. It enables a breeder to benefit from the commercialisation of his variety soon after filing of the application. However, in the case of patent, the protection is available only when the patent has been sealed. We should evaluate whether India will benefit by providing mandatory protection from the date of filing application as called for in UPOV 1991. The advantage is that it helps in providing access to farmers to a new technology quickly. The harm is that for transgenic or other such varieties which may need to be evaluated for their environmental and other impacts, a quick protection may lead to avoidable hazards. My proposal is that all varieties which involve transgenic technology must require regulatory trials under contained conditions, no matter whether protection is sought or not. However, for other varieties where there is no likely hazard, immediate protection can be provided.
10. The *sui generis* system is expected to provide effective protection for the plant varieties and, as in some countries, animal breeds. Majority of the countries who have enacted the Plant Variety Protection Laws after 1995 have tried to bring harmony with 1978 Act, except in a few cases where provisions of 1991 have been drawn upon. Korea is one such country which gives the holder the right to produce, propagate, process, assign, lease, export, import or display the protected variety. This is a very sweeping range of rights. This is a very contentious issue and Indian position in the next round of discussion on TRIPS in 2000 should require discussion on *(a) reciprocity in effective protection, i.e., those who access farmers' varieties must disclose, acknowledge and undertake to provide reasonable share of their revenue with germplasm providers/conservators through appropriate institutions, (b) need for PVP/patent claimant to unambiguously prove that the materials in which improvements have been made, had been obtained*

lawfully and rightfully. The first requires compliance with international and national laws and second requires moral responsibility of not taking something (without due consideration) from someone who is not aware of its true worth, (c) the breeders will be able to exclude large farmers and estate owners from the privilege of keeping one's own seed for perpetual use, and (d) the breeder should also undertake responsibility that the variety will demonstrate under farmers' conditions, the characteristics that it is claimed to have. The breeder can specify the range of agro-climatic and management conditions in which this will happen. Failing in this, he will be liable for prosecution.

The effective protection has to be reciprocal, i.e., for the breeder as well as for the farmer. There is an argument that farmers' right to performance of seed as per the claim should be covered by Seed Act rather than by PVP Act. There is merit in this argument because Seed Act is aimed at dealing with provision of quality seeds in sufficient quantities to the farmer. The disadvantage is in the asymmetry in the rights of those who claim protection for certain attributes of a variety and those who buy these variety precisely for those characteristics.

11. Each of the word in Article 27.3 b of TRIPS may come up for discussion during the next round of WTO meeting on the subject. The key words involved in this Article (Tansey, 1999) are: plants, animals, micro-organisms, essentially biological process, non-biological, macro-biological, plant varieties, effective and *sui generis* system. The application of patent law is being demanded by developed countries to biological materials or processes such as DNA sequences that can express in the form of certain specific proteins, varieties, cells, hybrids and parent lines, transgenic plants, animals and processes. Correa (1998) fears that patenting of genes at the cell level might extend this scope of protection to all the plants which had the cell with the claimed genes. In fact this can happen even if only the genes are transferred without transferring the whole nuclei or cell. Some of the countries exclude materials found in nature, even if in isolated form. This will practically shut the door on the research to find microbial organisms performing specific functions. It is well known that a research to identify and isolate, purify and propagate the macro-organisms of such kind is labour and capital intensive and therefore, benefits of such research may not flow to the countries where such protection is not available. Further, the growth of domestic biotechnology industry may also be hampered by such constraints. On the other hand, the current provisions of TRIPS in regard to micro-organisms are totally unsatisfactory. For instance, several multinational companies have taken patents on antibiotics producing micro-organisms isolated from soil samples taken from India and even acknowledged in the patent documents without any reciprocity for the country or the region from which these samples were taken. American Type Culture Collection Centre (ATCC) does not require the depositor of unique microbial culture to disclose (a) whether the material has been taken through prior informed consent, (b) whether its attributes have been shared with the country/community from where it has been taken and (c) whether it will be accessible to the researchers/communities for local applications in the providing region. India may like to pursue these ideas in the November 1999 round of discussion.

12. Several alternative drafts that have been circulated by voluntary organisations to replace the Plant Variety Act provide useful areas for discussion. What is ignored is that in an international law rights are reciprocal, i.e., the protection that Indian breeders may need in other countries, they are required to provide to others in our own country. Further, having become member of WTO, we cannot choose to develop a system suitable for our purposes which other countries find inhibitory or restrictive or not sufficiently comprehensive. While certain provisions such as requirement of novelty and exclusion of 'common knowledge' are certainly worth elaborating (Ravishankar, 1999). The common knowledge could be obtained from oral, documented practice or from reference collections from *ex situ* gene banks and of course, from the official register of varieties. One cannot restrict common knowledge only to the official register of varieties. This is not to deny the need for developing such a register in due course to incorporate whatever knowledge one can collect from the people about the local land races. The present situation of the descriptors maintained by most gene banks in agricultural universities and ICAR institutions is not very encouraging. In most cases, the name of the villages from where the seed was collected is not given, much less the name of the farmer/s. We have not come across any case where farmers' knowledge particularly that of women is given. The protection of such knowledge thus becomes difficult. The efforts by Honey Bee Network initiated ten years ago are an exception in this regard. Honey Bee Network has maintained with the help of SRISTI, IIMA, other network members, editors of local language versions of Honey Bee newsletter (in Tamil, Gujarati, Hindi, Kannada, Telugu, http://csf.colorado.edu/sristi/), a national register of innovations, new varieties developed by the farmers recently as distinct from land races. It is our contention that those who plead for restricting breeders' rights assume that commercially useful breeding can perhaps be done only by large corporations or international organisations - a contention which we strongly dispute. We have been campaigning for protection of intellectual property rights of the innovators for the last ten years much before anyone else had raised these issues from the farmers' perspective. The key difference in our perspective and that of other NGOs (including the proposal of CoFaB, Convention of Farmers and Breeders) is that we believe in the need for stronger breeders' rights whether in the formal or informal sector. We also do not want to treat all the farmers alike. There is no reason why farmers particularly the bigger ones in green revolution region and other irrigated areas who have benefited from the blending of land races conserved in rainfed regions, should not share part of the benefits with the poor land race growing farmers in rainfed and mountain regions. These benefits will not flow unless the beneficiaries of the private and public sector breeding agree to pay a small contribution per hectare towards the conservation fund. This fund, as proposed earlier, will provide incentives to the grower of land races so that they do not stop growing land races either on account of continued deprivation, or on account of more remunerative alternatives. If growing land races for at least ten per cent of the farmers in every region is equally remunerative, land races will continue to be grown. Most opponents of Plant Variety Act and breeders' rights have not explained the process and mechanism through which resources will be generated for providing incentives for inventive and innovative activities at farm, in firms and

within India and abroad apart from *in situ* conservation. By reducing the period of protection these NGOs are essentially killing the goose, which may lay golden eggs if properly regulated and nurtured. It is futile to expect governments in various developing countries to provide incentives for conservation to the growers of land races when most of them don't have the money even to pay salary to their staff. If incentives are not right, technological flow and investments will not take place. Swanson (1998) draws our attention to what Hart and Moore, (1990) call as "property right failure" that is when "the best investor in an asset is not the property right holder". The providers of genetic resources which contribute about 35 per cent of the production of modern rice varieties (Evenson, 1995) do not get adequately rewarded. One accession according to Evenson's study has present value of about $ 86-272 million. Value of 1000 accessions with no known history of use was about $ 100-350 million. Contribution of germplasm since 1960 (when the initial stock of rice germplasm was 20,000) has been estimated to be responsible for fully 20 per cent of green revolution in rice production. Case for reciprocity in rights and benefit sharing is obvious. What is more alarming is that flow of genetic resources among countries is believed to have come down drastically after CBD that is in the last 6-7 years. In the absence of proper restitution of rights, exchange will remain handicapped and so will suffer the growth prospects of agriculture in particularly developing countries but even globally.

13. While we strongly support the need for evolving mechanisms for protecting community intellectual property rights, we strongly question the assumption that such rights only belong to communities and not to individuals. Honey Bee data base demonstrates with more than ten thousand innovations the fact that there are individuals who excel and innovate in reproducing if not producing, traditional knowledge and also who produce contemporary innovations. The proposed Plant Variety and Animal Breed Act of India should provide incentives for individual farmers and local communities to register and seek protection on their results of innovative efforts. The high transaction costs involved in filing and obtaining the varietal and breed protection should be subsidised by the conservation fund as well as by Zilla Parishads and state legislatures.
14. Trade and protected varieties and breeds particularly of transgenic nature will require strong biosafety regulations and implementation capacity of the regulations at various levels ranging from lab to the national level. It must however be remembered that much greater environmental damage takes place due to existing chemical pesticides compared to the possible damage that may be caused by a transgenic pest tolerant crop. For, a small farmer would certainly be benefited if he or she can buy seeds of transgenic crop at reasonable rate rather than taking huge loans for buying pesticides and then in some unfortunate cases, committing suicides. No technological change is cost less. The most dramatic genetic erosion, i.e., loss of area under land races took place through the evolution and diffusion of high yielding varieties in what is called as green revolution. It should not be forgotten that this revolution was ushered in by public sector, research and extension institutions and private seed companies had practically no role. If one looks at the current seed protection policies and programmes of public sector seed corporations at national and state level, one would notice a very narrow varietal base. It is not suggested here that involvement of private sector will necessarily correct these problems. But it is obvious that private seed company can only survive if it can produce

something which is distinctive, stable, uniform and new - the objectives of Plant Variety Act. Likewise, the public sector research institutions have not been able to generate revenue from the sale of the seed that they develop to seed companies. So much so, even the brand name of 'Pusa' seed which generates tremendous advantages for seed companies selling IARI Pusa seeds, is not registered under Trade Mark Act., and thus generates any revenue for IARI.

15. Geographical Indications must be protected as has become so apparent after Basmati case. Since registration of wines, as said earlier, will come up for review in 2000 as a part of TRIPS review, India must take up the need for developing global registry for (a) small green innovations (such as herbal pesticides, growth regulators, etc., developed by farmers, artisans, local communities), (b) geographical indications and (c) land races so that improper grant of PVP or patents (as was done in Australia for Indian chickpea germplasm accessed from gene bank of ICRISAT) does not take place.
16. New uses of existing varieties/medicinal plants should be provided protection to give boost to herbal research in India and at the same time coded knowledge in ISM (Indian System of Medicines) must be excluded from PVP as well as patent protection.
17. To integrate implications of CBD, International Undertaking for Plant Genetic Resources of FAO, and Committee on Trade and Environment under WTO, a working group must be set up by Government of India so that our efforts in each of this forum are co-ordinated and synergised which obviously is not the case at present.

The measures suggested in this note imply a three-pronged strategy to deal with the implications of WTO on Indian agriculture from the perspective of intellectual property rights, particularly Plant Variety Act: (a) make domestic inventive and innovative activity more buoyant at grassroots as well as at formal institutional level, (b) provide protection to breeders within the country and outside to trigger two-way technological flow from and to India and (c) ensure through viable and effective farmer privileges and biosafety regulations that environmental, economic ethical, and efficiency gains are not compromised while enabling trade and technology transfer.

One should not look at India remaining as only a technology recipient country. With all the inventive potential that exists at different levels, India should become a leader in provisions of sustainable technologies around the world.

## VII

## SUMMING UP: KEY ISSUES FOR FUTURE NEGOTIATION

(a) The need for explicit recognition of farmer's privileges and farmer's rights in the *sui generis* system.
(b) The need to harmonise the implications of CBD, CTE and international undertaking on plant genetic resources.
(c) Every patent and plant protection authority should be required to ascertain from the applicant seeking plant variety protection or product patent on herbal or agricultural product that the raw material and information used in the innovation has been obtained lawfully, rightfully and through prior-informed consent of the providing country and the communities.

(d) Just as there exists a proposal in TRIPS for negotiating global registry of wines, India should assert that a similar Global Registry for Grassroots Innovations is needed to include land races, herbal products developed by small farmers alone or in collaboration with farmer scientists.

(e) In view of the impact of lower tariffs on deforestation, the discussion on forest products should be carefully pursued. Since India is unlikely to become exporter of forest products and will remain a net importer, the lower tariff will only mean lesser cost of production by domestic industry based on imported raw material. India may consider this position while negotiating.

(f) The environmental implications of international trade holds tremendous challenge in agriculture particularly in the fishery sector where Indian exports may come up for restrictions due to unsafe handling of protected species, incidental catch of dolphins or other such issues. Since the conservation is a national priority, India should not oppose environmental regulations unless these were discriminatory vis-a-vis importing countries on standards or practices.

(g) The insistence on DUS for varietal registration should be modified to include distinctive but heterogeneous and stable over three to four generations particularly in marginal environments. This will help in the development of varieties with buffering population and multi-line composition for rainfed regions.

(h) The exemption of small farmers from the restrictions to save, exchange or sell seed without using brand name may be incorporated in the revised Article 27(3 b). Similarly, restrictions on varietal protection to varieties in common knowledge must be incorporated and penalty is introduced for such attempts.

(i) While plant varieties have been covered by UPOV, animal breeds are not covered by any such protection. This may be taken up for negotiation.

(j) The products of genetically engineered varieties must be compulsorily labelled to help consumer make informed choices. Further the biosafety implications must be also incorporated in the Plant Variety Act so that registration is under PVP is contingent on the satisfactory completion of biosafety and bioethical requirements.

(k) The provision for community intellectual property rights may also be negotiated along with the need for low transaction cost system for small farmer innovator.

(l) The new uses of an existing product are protected as use patents in U.S.A. but not in Europe. India may pursue this issue both domestically and internationally.

(m) International registry proposed earlier should also include geographical indication for varieties.

The knowledge intensity of Indian agriculture has to go up if it has to become competitive globally and at the same responsive to the urges of local communities which conserve agro-biodiversity that made green revolution possible. In this paper, I have suggested changes at domestic as well as international level that can help to some extent in doing that. Blending creativity at grassroots level with excellence in formal science - a task ignored by agricultural policy makers for so long - can indeed help make Indian agriculture sustainable and productive. Protection of intellectual property rights of Indian scientists, communities, and individual creative individuals is essential if knowledge - rich economically poor people have to become the hub of transformation in Indian agriculture.

ANNEXURE

List of Plant Variety Acts of different countries reviewed for preparing this paper

1) Federal Law on the Protection of Plant Varieties (Variety Protection Law), Austria
2) Plant Breeder's Rights Act 1994o. 110 of 1994, Australia
3) Plant Variety Patent law, Republic of Belarus
4) Subregional Integration Agreement, Common Provisions on the Protection of the Rights of Breeders of New Plant Varieties, Bolivia
5) Protection of New Varieties of Plants Act, 1999, Canada
6) Plant Variety Protection Law, 1997, Republic of Croatia
7) On the Rights of Breeders of New Varieties of Plants, Law No. 19.342, Chile
8) Regulations of the People's Republic of China on the Protection of New Varieties of Plants
9) Decree No. 533 of March 8, 1994, Introducing Regulations to the Common Provisions on the Protection of the Rights of Breeder's of New Plant Varieties, Colombia
10) Decree of the Federal Ministry of Agriculture and Food Concerning the Implementation of Certain Provisions of Law No. 132/1989 of the Collection of Laws on the Legal Protection of New Varieties of Plants and Breeds of Animals, Czechoslovakia
11) Plant Novelties Act No. 866 of December 23, 1987, as Amended by Act No. 1107 of December 21, 1994, Denmark
12) Law on Breeders' Rights of August 21, 1992, Finland
13) Decree Concerning the Committee for the Protection of New Plant Varieties, France
14) Law on the Protection of New Plant Varieties No. 70-489 of June 11, 1970, France
15) Plant Varieties (Proprietary Rights) Act, 1980, Ireland
16) Implementing Regulations of the Decree of the President of the Republic No. 974 of August 12, 1975, on the Protection of New Plant Varieties,* Consolidated Text of the Decree of October 22, 1976, as Amended by Decree of February 26, 1986, Italy
17) The Seeds and Plant Varieties Act, 1972, Kenya
18) Law on the Protection of Plant Varieties, Moldova
19) Law on the Protection of New Plant Varieties, Kingdom of Morocco
20) Seeds and Planting Material Act Consolidated Text of the Act of October 6, 1966, as Last Amended by the Act of May 2, 1984, The Netherlands
21) Plant Variety Rights Act 1987, Number 5 of 1987 as Amended by the Plant Variety Rights Amendment Act 1990 of August 1, 1990, and the Plant Variety Rights Amendment Act 1994, New Zealand
22) Act of March 12, 1993, Relating to the Plant Breeder's Right, Norway
23) Seed Industry Law of October 10, 1987, Poland
24) Ministerial Order No. 940/90* of October 4, 1990 as Amended by Ministerial Order No. 351/91 of April 20, 1991, Portugal
25) Law on the Protection of Selection Achievements* (of August 6, 1993), Russian Federation
26) Law on Plant Variety Protection, Slovenia
27) Law on the Protection of Plant Varieties (No. 12/1975 of March 12, 1975), Spain
28) Plant Breeders' Rights Law* Consolidated Text of the Law of May 27, 1971,

29) As Amended by the Law of June 30, 1971, the Law of August 24, 1977,
30) The Law of November 10, 1982, and the Law of May 9, 1985, Sweden
31) Protection of New Plant Varieties Act, 1996, Trinidad and Tobago
32) Plant Varieties and Seed Act, 1964, United Kingdom
33) Plant Variety Protection Act* as last Amended by the Plant Variety Protection Act Amendments of 1994, United States of America
34) Law on Selection Achievements, Republic of Uzbekistan
35) Subregional Integration Agreement, Common Provisions on the Protection of Rights of Breeders of New Plant Varieties, Venezuela
36) Regulations Relating to Plant Breeders Rights, South Africa
37) Plant Breeders Rights Act, Zimbabwe

## NOTES

1. Based on Gupta, Anil K. (1996), "Rewarding Creativity for Conserving Diversity in Third World: Can IPR Regime Serve the Needs of Contemporay and Traditional Knowledge Experts and Communities in Third World?", Paper presented in the International Association for the Protection of Industrial Property Forum (September 10-14, 1996) on Ethical and Ecological Aspects of IPRs, Interlaken, Switzerland, on 13 September, 1996 since published in Cottier *et al.*, 1999.

2. This argument has arisen in the context of Article 15.5 as well as Article 8j and 10c of Convention on Biological Diversity (CBD). The prior informed consent is required only of parties to convention, i.e., the contracting nation states and not of the knowledge and resource providing communities. Under Article 8j however, the approval and involvement of local communities and individuals is required for ensuing equitable sharing of the benefits. Whether that happens will of course depend upon the legislative environment and local institutional capacity in each country. The institutions which deprived knowledge-rich economically poor people of their basic rights and needs would let any benefits trickle down to them will depend upon access of such people to alternative frameworks of negotiation and mutually agreeable contracts.

2. SRISTI has already prepared a multi-media and multi-language Honey Bee data base on grassroots innovations which was presented as an only product of its kind at Global Knowledge Conference, Toronto, 1997. It helps to overcome the barriers of language, literacy, and localism among the farmer, artisinal and tribal learners. An illiterate farmer can see picture and films of the innovation, hear the sound in his/her language and also learn not just from his/her own village but from practically anywhere. The next phase of this technology will be a touch screen data - base which farmers can operate on their own without any outside mediation to retrieve as well as to submit information about innovations.

4. Notwithstanding tremendous misinformation that was spread in India by various NGOs and some of the ill-informed media, neem tree was never patented, nor could it ever be patented in future. Similarly, the common usage of neem for plant protection, or dental care or storing seeds, etc., were not restricted in any way by the patents that were granted to Indian companies like Godrej Soaps, public sector labs like National Chemical Laboratories or international companies like W.R. Grace. What was protected was improvement in increasing the shelf life, or new uses of neem compounds (say for growing hairs on baldy head, or controlling cancer, or as contraceptives) or new methods of extracting known compounds. Legitimate as these activities are, both Indian and international companies and institutes sought protection for their intellectual property.

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