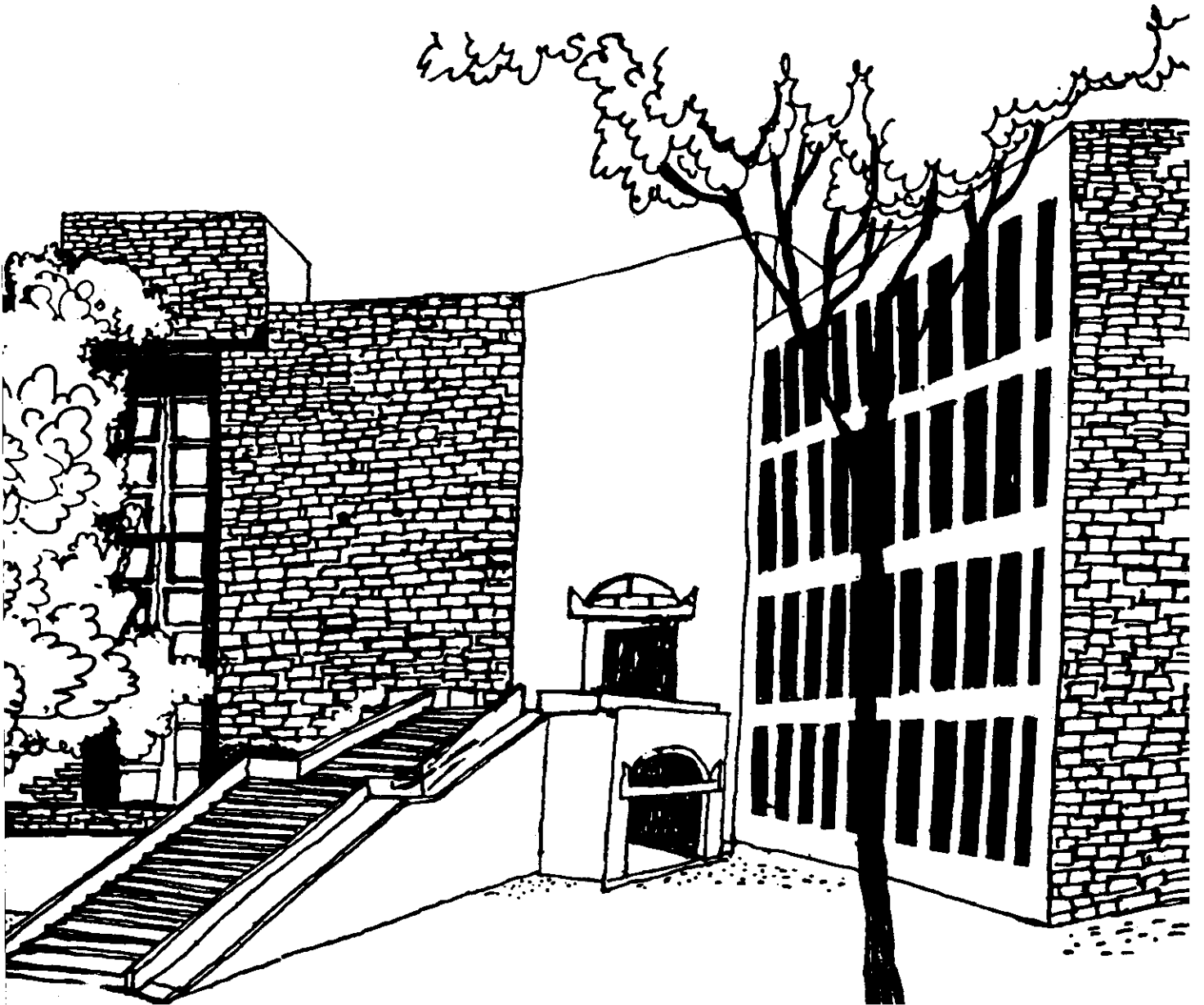




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Working Paper



**DEBATE ON BIOTECHNOLOGY AND INTELLECTUAL
PROPERTY RIGHTS: PROTECTING THE INTERESTS
OF THIRD WORLD FARMERS AND SCIENTISTS**

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Debate on Biotechnology and Intellectual Property Rights: Protecting the interests of third world farmers and scientists

Anil K Gupta

Abstract

The debate on protection of intellectual property rights of the companies and scientific labs developing technologies through biotechnological means or otherwise has been highly surcharged with the emotions. I have argued in this paper that developing countries like India should negotiate this subject with the position of strength and not weakness. In the case of biotechnology, the technology gap is the shortest to bridge compared to most industrial technologies. By compromising on Industrial front, we could gain a lot on biotechnological front. We should simultaneously refuse to accept the idea that biodiversity is the global common heritage. We should in fact document and patent various land races and other germ plasm in the name of local communities. The land races do not survive by chance or accident. Conscious effort and attention of local communities makes that possible. We should accept the principle that innovators wherever they are and who so ever they are must be protected and compensated. It is natural that this protection should extend to third world scientists and farmers too. We do not agree with those who think that by extending IPRs to crop varieties we would lose the game to MNCs. On the contrary, by protecting the rights of local communities, we would be able to stake the right of third world farmers to have a share in the global profits of Multinational seed companies.

The contentions of those dominating the technological frontiers are given in part one of the paper. The concerns of the developing countries are mentioned in Part Two. The alternative ways in which we can operationalize the concept of Farmers' Rights and compensate them for their innovations and intellectual property rights are discussed in part three. Issues for further discussion have been listed in part four.

Debate on Biotechnology and Intellectual Property Rights: Protecting the interests of third world farmers and scientists¹

Anil K Gupta²

The debate on protection of intellectual property rights of the companies and scientific labs developing technologies through biotechnological means or otherwise has been highly surcharged with the emotions. The contentions of those dominating the technological frontiers are given in part one of the paper. The concerns of the developing countries are mentioned in Part Two. The alternative ways in which we can operationalise the concept of Farmers' Rights and compensate them for their innovations and intellectual property rights are discussed in part three. Issues for further discussion have been listed in part four.

Part- One

The Contention of The Developed Countries:

1. It takes a huge amount of financial and manpower investment for generating a given technology. It is necessary that the investors should be able to recover their cost besides earning 'reasonable' profits. Study by International Trade Commission (ITC) revealed that world wide losses of 193 US firms in 1986 on this account were US \$ 23.80 billion or 2.7 per cent of their sales. The world wide losses to the entire US industry on this account were expected to range from US \$ 43 to 61 billion in 1986. (IPC/KEIDANEREN/UNICE 1988, 12-13)³

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1. This is a slightly revised version of the paper presented at National Seminar on Commercialization of Biotechnologies at IIM-A, 1992 sponsored by Biotech Consortium, New Delhi.
 2. Professor, Centre for Management in Agriculture, and Chairperson, RM Centre for Educational Innovation, Indian Institute of Management, Ahmedabad-380015
 3. In part one of this paper, this and other references are from a recent study by Jeroen van Wijk and Junne, Strengthening, Intellectual Property Protection Worldwide: Implications and Options for Developing Countries, University of Amsterdam, February 1992; henceforth referred as Wijk 1992. Author is grateful to Wijk for sharing pre-publication draft of their paper for comments and critique.

Reference is also made to two other studies: Ministry of Foreign Affairs, The Hague, Netherlands, "The impact of Intellectual Property Protection in Biotechnology and Plant Breeding on Developing Countries, Report of a Stud

2. Both the major international intellectual property right (IPR) conventions i.e. the *Paris Convention For Protection of Intellectual Property* (Paris Convention) and the *Berne Convention for the Protection of Literary and Artistic Work* (Berne Convention) provide different norms for the minimum standards to be met by various member countries. The Paris convention does not and Berne convention provides only to a limited extent the standards that different countries should meet. Both the conventions are based on the so called national treatment principle implying similar protection to national and foreign citizens (Wijk, 1992).

3. Since both the conventions lack enforcement provisions and a conflict resolution mechanism, the developed countries have insisted that the negotiation be pursued on *Trade Related Aspects of Intellectual Property, including Trading, Counterfeit Goods* (TRIPs). The reasons are two fold, "firstly, placing the intellectual property issue in a trade context enables package deals which tie developing countries' advances in intellectual property protection to access to export markets in industrialized countries. Secondly, GATT contains an effective dispute settlement mechanism, the use of which would facilitate relatively quick, enforceable action against countries which violate GATT intellectual property regulations (Wijk, 1992)." This is a view which many developing countries including India had opposed.

US government has used special provision 301 of American Trade Act revised in 1988 to deal with shortcomings in IPR legislation in various developing countries. The link between trade and IPR has been explicitly emphasized. Countries which refused to comply with US demands have been threatened

...Continued...

Reference is also made to two other studies: Ministry of Foreign Affairs, The Hague, Netherlands, "The impact of Intellectual Property Protection in Biotechnology and Plant Breeding on Developing Countries, Report of a Study Committee on Biotechnology and Intellectual Property Rights with Respect to Developing Countries, 1991 (henceforth referred as Study Committee) and Usha Menon, 1992, "The Convention on Biodiversity, Intellectual Property Rights and Policy Options, NISTADS, New Delhi.

with trade sanctions⁴.

4. Even though developing countries which are in majority in United Nations have preferred that *World Intellectual Property Organization* (WIPO) administers the IPR conventions, the developed countries have insisted that this be done under GATT for the reasons mentioned above.

5. The developed countries have been most insistent about the IPR protection with particular reference to pharmaceutical industry. This industry worldwide has a turnover of approximately US dollar 120 billion and six industrialized countries (West Germany, United Kingdom, France, Italy, U.S., Japan) produced about 80 percent of the total world's output (Hall, 1986:35 in Wijk, 1992). Out of this, 20 largest firms accounts for about 50 per cent of the sales and 85 percent of R&D expenditure (Ibid:11).

The US International Trade Commission recently estimated that cost of taking a drug from discovery to marketing status in the US increased from US dollar 54 million to US dollar 231 million during 1976 and 1990 (WIPR, 1991:336). The competition from the generic drugs protected neither by patents nor brand names is most intense. The developed countries would prefer that just like the European Community Regulation providing for a *Supplementary Protection Certificates*, five years should be added to the 20 year life of a pharmaceutical patent so that medicinal product would benefit from a maximum 15 year effective protection (WIPR, 1992:34). The debate on pharmaceutical patents, Wijk argues is related very closely to the protection of biotechnological inventions because half of the investments in biotechnology

4. During 1982 under Rajiv-Reagan accord on Indo-US agreement, a joint committee was set up to review this issue of Super 301. The meetings were postponed twice and India was kept on a priority watchlist. It was taken out of this list for some time and brought back in August, 1990. Recently, American administrator of the Act, Carla Hills reminded the Indian government that she would not be able to hedge the issue any further, if Indian government did not accept GATT provisions. She, however, did acknowledge considerable modification in Indian position. The implication of 301 is not only trade sanctions but also restriction on transfer of any strategic technology/ies likely to be transferred to third party affecting American interest. Such technologies might not be transferred to India at all (Gupta, 1991).

are devoted to the development of the pharmaceuticals⁵.

6. The biotechnological inventions (technologies for gene and protein sequences, recombinant DNA, self-fusion, fermentation, cell culture, DNA finger printing, etc.) were not within the purview of patent system until 1970s. It was feared that patents for plants might restrict the free international exchange of plant genetic material. The debate in Europe, Wijk points out, deals with the question about living material being patentable or not. In US the debate is about living material being *new* or not. Under the American law, unlike the European laws, a patent can be given to anyone who "invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof" (Wijk, 1992:13).

7. The American patent laws after 1977 defined the natural product and insisted that the new definition be accepted by various developing countries. The US Patent and Trade Mark Office would not grant patents for living organisms *per se* considering them "products of nature" and not statutory subject matter. The Court of Customs and Appeals (CCPA) resolved that a natural product could not be patented *per se* but could be done in any new form or composition. This meant that a natural product after purification could be considered new and thus patentable. It was asserted that, "these natural products exist in nature, but in a form in which they are essentially unusable, atleast compared to their utility as isolated from nature and purified" (Armitage, 1989:47-48 in Wijk, 1992).

The first patent was issued in 1980 to a scientist of Indian origin viz. Chakraborty, for genetically engineered bacteria capable of cleaning oil spills⁶. Even though this decision was taken by the Supreme Court with the majority of only one (5 to 4), a patent for maize variety containing higher level of trypto-

5. It may be useful to refer to the statement of Vice Chairman of Ranbaxy, a leading private sector pharmaceutical company in India(Weekend Observer, Sept 28, 1992) about the possibility of Indian pharmaceutical companies withstanding the global IPR regime due to their competitiveness. This is of course an exceptional voice among the leaders of Indian Pharmaceutical industry(which other wise has been strongest against the Dunkell draft and any other attempt aimed at harmonization of IPR regimes across countries).

6. It is a different matter that this bacteria was never used lest it infiltrated the oil wells to eat away the entire oil.

phan, an amino acid, was awarded in 1985 (Armitage, 1989:49). Polyploid oysters were patented in 1987 and a genetically engineered mouse with a particular susceptibility to cancer for use in cancer research was granted in 1988 (OTA, 1989). Human genes which have been used for making biotechnological products such as insulin and the blood-clot dissolver Tissue Plasminogen Activator have also been patented⁷.

8. European patent laws subscribed by 14 member countries of the European Patent Convention (EPC), "exclude from patentability : plant or animal varieties or essentially biological processors for the production of plants or animals. This provision does not apply to micro biological processes or the production thereof" (Wijk, 1992). The European biotechnology industry, Wijk adds, does not favour the retention of these exclusions under Article 53 (b) of the EPC lest they lose out to American and Japanese industries. A *Council Directive on the Legal Protection of Biotechnological Inventions* proposed by EC Commission in 1988 aims at a broad patent coverage, "including all living materials as such and processes using such material when they are derived as a subsequent generation from patented living material (DGIS, 1991:11). The draft is yet to be finalized.

The European Patent Office (EPO) granted the first patent on a plant in 1989. The Technical Board of Appeal of the EPO argued that a plant variety could be defined as a multiplicity of plants having homogeneous characteristics which remain stable after every propagation. The hybrid seeds on the other hand, it was argued, did not remain stable in successive generation and thus could not be considered a *variety* and thus were patentable.

The implications are that by changing a single gene or very few genes, the rest of the genes of a crop variety could be patented even though no change whatsoever had been made in the 99 per cent of the

7. Nies (1990:484 in Wijk, 1992) points out that the issue of validity of American patents on living material has not been fully resolved. Except one case regarding micro organisms, other leading cases involving biotechnological patents were administrative rather than judicial decisions. The US Court of Appeals for the Federal Circuit and the Supreme Court are yet to give their judgment on patenting of life forms other than micro organisms. In Europe patenting of micro organisms has been possible right from 1973.

The Breeders Right in Europe are being extended such that in future any company will be prevented even from incorporating a small part of the patented germplasm. The EEC directive on patenting of life form "seeks to end both these exemptions. Article 12 of the directive seeks to extend patent protection to the product initially obtained by the patented process, but also the identical or differentiated products of the first or subsequent generations obtained therefrom. Similarly Article 13 stipulates that the patent would be applicable to all products in which genetic information pertaining to patented product has been incorporated" (Economic Times, Feb 13, 1990). The small European companies would find it difficult to compete with large European and American Seed Companies. In a conflict of this kind both the large and the small Indian seed companies might suffer(Gupta,1991).

9. The developed countries have argued for harmonization of the patent laws of various developing countries. The *Treaty on the Harmonization of Certain Provisions in Laws for the Protection of Inventions* (Harmonization Treaty) under WIPO has been under discussion since 1984 so that American, European and Japanese patent laws regarding the grace period (the period for public disclosure of an invention prior to filing an application) could be harmonized. Further uniformity was also required regarding the decision about whom a patent should be granted i.e. the one who was the first inventor (as is the case in U.S.) or to the one who file the first application (as in Europe and Japan) (WIPO, 1990c:2 in Wijk, 1992). American and Swiss negotiators have suggested in the discussion on Harmonization Treaty under Paris Convention that patent coverage be extended to all the technological sectors. Most European countries while agreeing with this, have proposed that plant or animal varieties as well as biological processes for the production of plant and animals may be excluded. But the plant varieties may be protected either by parents or *sui generis* system (WIPO, 1990d-f in Wijk, 1992).

10. The industrialized countries have proposed that the patent holders rights should be strengthened such as:

- a) a patent term of at least 20 years from the date of patent filing,
- b) extension of the protection of a patented process to the products obtained by that process, in order to protect a patented process effectively,
- c) restrictions on arbitrary authorization of non-voluntary licensing by governments (Wijk, 1992:16).

The developed countries would like the authority of TRIPs under GATT to be accepted for resolving any conflict. Failure of GATT negotiations so far has also led to the postponement of final discussions regarding Harmonization Treaty (van Wijk, 1992).

11. The plant varieties traditionally could be protected by Plant Breeders' Rights (PBR). The Breeders' exemption provided use of a protected variety for creating new varieties and the commercial exploitation of these new varieties was free. The use of on-farm harvested material of protective varieties for the next production cycle as seed was accepted and included under the so called *farmers' privileges* (DGIS, 1991:4). The PBR provides less protection than the patents. Wijk highlights that *the research exemption* under the patent law was far more restrictive than the breeders' exemption under PBR regarding unauthorized use of protected matter. The farmers' privilege was unknown in patent legislation. This is the reason why patenting is being opposed even by European farmers. Under patent, "protection of processes, such as identification, isolation and transference of genetic material, may be extended to the entire organism in which the genetic material has been inserted, and even to all generations of this organism as long as the patent lasts (Wijk, 1992:18).

12. The *International Convention for the Protection of New Varieties of Plants* (UPOV Convention) with 21 member states was primarily an institution of developed countries till 1991 when Argentina and Uruguay became members of UPOV (UPOV Newsletter, No.66, December, 1991:4). Under WIPO, 23 developing countries have joined hands and under TRIPs 14 developing countries have similarly come together to oppose the efforts for global uniformity in IPR systems. The developed countries obviously do not appreciate this resistance and have used various economic and political pressures to bring the

developing countries around their views. Recently, transfer of technology from Russia to India was opposed by USA primarily because India was not considered trustworthy regarding the possible uses of such technologies. In this case, the technology was Russian but Russia was vulnerable to US pressure due to recent economic crisis in erstwhile USSR.

Part Two

The position of developing countries

The major argument of developing countries through various proposals brought forward in WIPO and TRIPs has been that the conducting parties should be allowed at least:

- a) to exclude subject matter from patent protection, such as pharmaceutical products, plant and animal varieties or essentially biological processes for the production of plants and animals,
- b) to protect only invented processes and to exclude products *per se* from patentability,
- c) to determine the most suitable patent term which could be less than 20 years⁸,
- d) to provide for a wide range of ground for compulsory licensing to enable governments to remove monopolies on the use of technology in the interest of its country⁹ (Wijk, 1992:19).

The fear about biotechnological processes and products has so far been largely based on the potential rather than actual impact of biotechnological changes on the Third World agriculture. The developing countries have argued that all life forms and the entire genetic diversity was a global common heritage. The exchange of germ plasm through various national and international agricultural research centres has been premised on this assumption. So far no newly synthesized gene has been incorporated in to a commercial product and to that extent whatever

8. The duration of patents generally varies from 5 to 20 years in most developing countries. Whereas in developed countries, it is 15-20 years that too in some cases from the date of application and in other cases from the date of registration.

South Korea and Mexico have already extended their patent term to 20 years including pharmaceuticals. India is being asked to follow the Mexican path of allowing patents for biotechnological inventions including plant varieties.

9. The compulsory licensing mitigates the monopolistic power to exclude competitors. It may be granted either in public interest, non-use of patent or dependency. In the first case, some governments may argue that compulsory licensing is necessary if an invention depends upon another patented invention. The License can be granted to effect diffusion of technology. If invention is possible only through infringement of an earlier patent, the compulsory license is given to the younger patent (Study Committee, 1991:16).

changes have taken place have required relocation of genes within or between varieties or sometime species (see Varadarajan, 1991).

The debate on the subject has been joined by the National Working Group on Patent Laws (1990) besides some of the political parties and other professional groups in India. However, Indian participation and articulation in the international forum such as FAO Commission on Plant Genetic Resources (CPGR) (Fourth Session, April 15 to 19, 1991, FAO, Rome) has not been very strong. This is particularly so in the context of the role India can play in helping other developing countries in conservation of germ plasm and developing more systematic methods for compensating farmers.

Indian Patent Act:

Indian Patent Act is considerably different from the provisions of Paris Convention. Paris Convention would prevent any firm from taking up a production locally of a product which was being imported by another company holding patent on the same. A country having large presence of multinational corporations and acceptance of Paris Convention can remain industrially less developed particularly if the imports are financed through exports of raw materials. However, such monopolies can arise more importantly if product patents are allowed. Indian Patent Act does not grant product patents. The pharmaceutical giants of the world, as mentioned earlier have reasons to complain when a drug patented abroad is manufactured and exported.

The December, 1990 issue of Bio-technology and Development Monitor (NR.5) has summarized the Indian case:

Under Indian patent law, 'the methods of agriculture or horticulture' and 'processes for the treatment of plants to render them free of disease or to increase their economic value or that of their products' are excluded in the Patents Act. Even though there is no explicit exclusion of animal or plant varieties or other bio-technological products, the patenting appears doubtful.

In the food, pharmaceutical and chemical sectors, only processes are patentable. The products are excluded.

The duration of Indian Patent is relatively short, i.e 14 years compared to 17 to 20 years in industrially advanced countries.

The conditions for granting compulsory license are considered too broad.

The Indian Patent Law permits granting of 'automatic license of right' in food, pharmaceuticals and chemical sectors.

The Indo-US science and technology initiative in force in 1982 has been postponed twice. In October 1988, 'an agreement was signed to extend the initiative, after India agreed to start bilateral discussions

on Intellectual Property Protection(IPP). Since May 1989, India was placed on American 'priority watch list' following 'special 301 provision of the US Omnibus Trade and Competitiveness Act of 1988'. Although most 'priority' countries have been removed to the less critical watch list, India was placed on the Priority Watch List for the second time in 1990.

India has consistently refused to deal with IPP under GATT and instead preferred discussion on this issue in World Intellectual Property Organization (WIPO). It has opposed the attempt of US and European community to harmonize patent laws all over the world. Brazil is the only other country among relatively developed low income countries which shares India's concerns. The ASSOCHAM suggests that the Indian government should sign the Paris Convention and standardize the life of Indian Patents for all substances to 14 years.

On the other hand, organizations like Indian Drug Manufacture Association (IDMA) and the Punjab, Haryana and Delhi Chamber of Commerce and Industry urge the government not to change the patent system lest it gives a blow to Indian pharmaceutical industry. It may be mentioned that more than 60 per cent of the drugs marketed in India have been found to be non-essential and in many cases redundant for the purpose for which they are marketed.

Government of India has set up a National Working Group on Patent Laws in 1988. This working group argues that Indian Patent Law has served the Indian interests very well. This group intends to keep biotechnology outside the purview of Patent Law.

The debate on the germ plasm conservation between IBPGR dominated by the Europe and USA and FAO sponsored Plant Breeders Right has at long last accepted the farmers' rights although the precise mechanism have not been spelt out.

FAO Committee on Plant Genetic Resources(CPGR) reiterated that farmers' rights be implemented through the international fund on the basis of a scientifically sound Global Plan of Action. It was hoped that such a fund

would, "reverse the trend towards the constraints in the exchange of plant genetic resources that had been growing in the past years...." (1991:4). The CPGR agreed that principle of national sovereignty over plant genetic resources within a nation's territory was vital and should be so stated in various international agreements. The CPGR concentrates on intra-specific diversity of species of actual or potential socio-economic value as distinct from UNESCO, IUCN, UNEP, which looked at the entire eco system and species diversity. CPGR recognized the role of farming communities and underlined the importance of both in-situ and ex-situ conservation. Various forms of legal agreement have been suggested and India has accepted the agreement type D which implies that country retain the ownership of the resources of the designated germ plasm, maintains charge of the premises, does not entitle FAO to have a right of unhindered access to the germ plasm collection, and all policies for collection, preservation and management would be decided by the country. However, under this agreement, India agrees to make the designated germ plasm available when necessary for the purposes of scientific research, plant breeding or genetic resource conservation, without restriction, either directly to users or through FAO, either on mutually agreed terms or free of cost (article 8, basic agreement type D, CPGR, 1991:65).

Even though Argentina, Ethiopia, Kenya, Spain and recently Norway, offered to provide space in their gene banks for establishment of international collections, India unfortunately did not offer similar facility. Even for permafrost conditions, India did not make an offer despite having facilities both at Antarctica and in Himalayan hills. CPGR discussed the recommendation of 98th session of FAO council for transforming the present non-binding International Undertaking on Plant Genetic Resources into a binding legal agreement either as a separate convention or as a legal instrument of Biological Diversity Convention. The CPGR suggested that the sustainable use of biotechnology in conservation and utilisation of plant genetic resources be accompanied by guaranteed unrestricted access to plant genetic resources, bio-safety so as to minimize environmental risks and the equitable sharing of the benefits of the biotechnology between the developers of the technology and the providers of the germ plasm. CPGR cautioned that IPRs should not become an obstacle to the free exchange of germ plasm, information and technology for scientific purposes. The rights of farmers as innovators who domesticated the crops and developed the land races had to be accepted. It was highlighted that free access did not mean free of charge. It was also suggested that early warning system be developed, "to alert those countries likely to be affect-

ed (by biotechnological developments in industrialized countries), and advise on possible adjustment policies and alternative crops, with the aim of minimizing possible economic distress" (1991:19).

It may be useful to note that the Working Group on Plant Genetic Resources in its 5th meeting (December 11-12, 1990 in CPGR, 1991:43) recommended that the contribution to the international fund for implementing farmers' right be made voluntary. The expert group had, however, recommended mandatory contributions of at least US dollar 500,000 per annum.

Usha Menon (1991:5) critiques this strategy of equating the farmers' rights with breeders' rights. She argues that the principle of common heritage was jettisoned by what she considers a false parallel between farmers and breeders rights. The developing countries by implication accepted, "as legitimate, monopolization of what was a public good through the system of plant breeders' rights (1991:6). She further adds that the farmers' rights have not delivered any benefit to the farmers so far. The donors to the fund could earmark their contribution for a specific project in which the donor was interested.

We do not accept the position that the product of a breeder's work is a public good just because the raw material, in this case the parent material might have been drawn from a public source. The argument against the similarity between farmers' and breeders' rights stands but not on this account.

Our position is that (a) we should not consider setting up of an international fund as the only means of compensating farmers, (b) various other measures mentioned below should also be given a reasonable chance, (c) the breeders' rights cannot be built upon negation of farmers' rights, (d) the land races are not necessarily product of one time selection by the farmers. The continuous selections imply as much investment of attention by farmers as by the breeders if not more, (e) the developing countries cannot make a strong case for resource transfer from developed countries if they do not agree for a similar transfer to the communities within those countries, which are extremely poor despite having maintained very high genetic diversity (Gupta, 1991), (f) the innovator must have an incentive for innovation because it requires considerable investment of time, energy and motivation. Society must reward such an investment if it wants to maintain entrepreneurial culture and experimental ethic among the

scientists as well as the farmers.

Thus the issue is **how much reward, for how long and to whom and not whether** reward should be there at all or not.

Unless India Patents the germplasm available in India and provides a similar facility to other developing countries there is no way the Indian seed companies and R & D institutions can withstand the onslaught of western multinationals. Indian position, I argue, should be to respect the patents and simultaneously apply IPP to all the wild and domesticated plant and animal resources. India must insist that all seed companies using genes from the parents collected from India directly or through CG Centres (Consultative Group on International Agriculture Research) will have to pay the compensation. Indian subsidiaries of large seed multinationals might be able to transmit germplasm or part of it to the parent companies without any hindrance under the present laws. Unlike the repatriation of the profits, the repatriation of germplasm or genes was far more easier.

Part three
Operationalising Farmers' Rights: Compensating Indigenous Innovators

In a recent paper (Gupta, 1991) entitled, "Sustainability through Biodiversity: Designing Crucible of Culture, Creativity and Conscience" (IIM Working Paper No.1005) four kinds of compensation mechanisms have been suggested.

		Form of Compensation	
		Material	Non-material
Client Group	Specific		
	Non - Specific		

The four kinds of compensation for innovations can be:

- a. Material- specific
- b. Non-material specific
- c. Non-specific material
- d. Non-specific non-material

The material - specific compensation would include royalty payment to a particular individual or group thereof. The non-material specific would mean a reward of honour by means of recognition without involving any monetary compensation. The non-specific material implies monetary investment in an institution serving the innovative people and disadvantaged groups. Such an institution would use the resources for the preservation and augmentation through experimentation and value addition in the innovations. This institute can also apply for patents in the name of people and in due course use the surplus for modifying property relations in the local areas. The non-specific and non-material instrument of compensation would mean changes in the basic protocol of dialogue on intellectual property rights. This will also imply improvement in the legal environment regarding right of people over resources around which they have developed various innovative strategies of survival.

There are several ways in which compensations can be routed to the generators and maintainers of biodiversity:

(i) Valuing biological diversity of potential future use: It is always a difficult question as to how much value one should assign to a resource of which current value is either low or nil. Several common property resources suffered not only because institutions managing these resources were weakened over time. But also because the local perception of these resources often did not match with the external or governmental or global perception of these resources.

(ii) A royalty may be paid to the communities which conserve the most diverse CPRs through taxing the consumers of a specific nature. For instance, Ignacy Sachs (1989) suggested automatic financing at the level of one dollar per hundred thousand of the world gross product (approximately 150 million dollars) to reach at the level of one per ten thousand ten years later. He observed that

"a maritime toll of US 30 cents per 10 thousand tons/mile of oil transported by sea would yield in 1988 156 million dollars, a toll of 1 dollar per 10 thousand tons/mile of oil products 146 million dollars, and another 17 million dollars could be raised with a US 10 cent fee for 10 thousand tons/mile of coal.

An air toll of 1 dollar per 10 thousand passengers/mile would yield 65 million dollars and a tax of 1 per thousand on the turnover of 31 thousand tourist agencies in the world US\$ 250 million" Owen (1987).

Juma (1989) feels that the logistics of tracking the global flow of germ plasm might make the process of compensation extremely complex. He suggests an 'incentive principle' of the kind recommended above under which farmers would be encouraged to conserve genetic resources and be rewarded for it financially. Farmers could be allowed to bargain for their varieties. He also feels that an alternative system could be to have a levy on global seed sales to be used for international fund to compensate farmers in their work. There are many other suggestions made drawing upon African experience by which the farmers rights can be protected.

(iii) In Peru examples have been found where local communities charge as much as 2000 US dollars per potato. They have an effective system of checking the outsiders at the exit points (Mario Tapia, 1991, Miguel A. Altieri, 1991). It has been observed that greatest genetic erosion has taken place in the low land regions near urban centres and markets in Latin America (Altieri, 1991). A cess on markets and municipal corporations could be an answer. In Maharashtra state in India a professional tax imposed in only one metropolitan city Bombay has enabled financing of a multi-crore Employment Guarantee Scheme in drought prone regions since 1972. Given political determination the compensatory taxes can be used to operationalise the concept of transfer pricing.

(iii) Pricing traditional/indigenous knowledge having current commercial value.

Studies have shown that out of 119 pure chemical substances extracted from higher plants and used in medicine throughout the world, about 70 percent medicines were used for the same purpose as identified by the local communities (Farnsworth, 1986). The intellectual property of the people has been usurped by the multinational drug companies which spent about 4.5 billion dollars on research and development in 1985. Farnsworth (1986) estimates that in one drug (oncovin, velban) based on vincristine generated about 100 million dollars revenue of which about 88 percent was profit for the company, Lilly Research Laboratories (Svoboda in Farnsworth, 1986). He regrets that more systematic effort were not being made to utilise indigenous knowledge about plant resources. He unfortunately does not make a case for sharing part of these profits with the communities.

McNeil and McNeil (1989) make a forceful case for appropriation of proper share for the social communities which have produced, maintained, and improvised various technological practices. They refer to provisions in the American Law under which such claims can be filed.

In another instance, Iltis (1986) shows that discovery of a wild tomato seed selection number 832 contributed to about 8 million dollars a year because of slight increase in the soluble solids. It costed US government about 21 dollar at 1961 prices to collect each specimen. While most ethnobotanist do not deliberate on the ways of sharing value earned out of local knowledge with the people, there are some exceptions like Saxena (1976), Bhandari (1977). Ehrenfeld (1986) on the contrary argues, "assigning value to that which we do not own and whose purpose we cannot understand except in the most superficial ways is the ultimate in presumptuous folly". He fears that by the time we finish assigning values to biological diversity, we may not have much diversity left. It is obvious that such a view would appear extremist. However, Ehrenfeld clarifies that what he is questioning is the economic value of bio-diversity. He observes

Value is an intrinsic part of diversity; it does not depend on the properties of the species in question, the uses to which particular species may or may not be put, or their alleged role in the balance of global ecosystems. For biological diversity, value is. Nothing more and nothing less. No cottage industry of expert evaluators is needed to assess this kind of value.

To him diversity must be protected through appeal to basic human values and faith in God or any other force that caused diversity to exist in the first place. On the other hand, Randall (1986) prefers a utilitarian account that extends beyond commercial goods to bio-diversity.

(iv) Decentralised Governance : Regional Development Boards comprising the representatives of different interest groups might be able to work out viable democratic alternatives for sustainable management of bio diversity. In situ conservation will not be very effective in retaining genes that may not express in the insulated research station environment. Ex situ conservation through botanical gardens can be useful

as a refuge of last resort and as Ashton (1986) observes: "a high-risk refuge, perhaps of no escape. The immediate role of botanical gardens in the ex situ culture of rare and endangered species lies in research and education rather than in conservation per se". Perhaps internationally generated resources can be used for funding establishment and management of botanical gardens in dispersed bio-rich locations.

(v) Rewarding farmers through fairs and competitions

: Another way tried by NGOs and professionals from the universities could be organisation of farmers fairs which reward not just the best samples or the specimens but the farmers who kept the widest diversity and knew most of the characteristics of what he or she had saved (Tapia *et. al.*, 1990; Franco, 1990; in Altieri, 1991). This strategy, the author contends, "may or may not promote reproduction or distribution of exhibited materials. Its basic aim is to stimulate farmers to keep diversity in their fields, hoping that incentives (such as public recognition, diplomas or tools for the farm) will make other farmers adopt or recover local varieties. Compared to the other three, this strategy is the one that needs less financial resources and demands less facilities. It is also the one that leaves most initiatives and decisions to farmers themselves. Its potential to promote living diversity is highest; however, its effectiveness may vary significantly according to the granted incentives" (Tapia *et al* 1990).

(vi) There is a clear trade-off in maintenance of genetic diversity through grass root level efforts and through global or international research centres in collaboration with multinational companies or otherwise. Altieri cites example of Columbian NGOs who were concerned after being informed by a CIAT researcher that it was abandoning work on bean varieties destined for marginal conditions (Diaz in Altieri, 1991). However, the cost and management aspects of decentralised grass root conservation centres either in the form of botanical gardens mentioned above or as informal research centres have to be carefully looked into. There will be a definite harm done to the cause of maintaining bio-diversity if state and corporate sector disown its responsibility because the NGOs are supposed to be engaged in the task.

The danger becomes all the more serious if these NGOs are large and funded by international agencies without any explicit accountability to local communities. In South Asian context, it is not uncommon to find large NGOs which are as inefficient in resource use as perhaps some of the state organisations may be. Also the programmatic preferences of NGOs keep changing with the preferences of the donor agencies. Obviously, a long term commitment to conserving bio-diversity is unlikely to emerge in such NGOs. Although, the rights of local communities will be realized mainly through the efforts of committed NGOs and other activists and professional groups.

(vii) There is a view that farmers rights should not be considered as an intellectual property system. Instead farmers should be compensated for the work that they do for the conservation and breeding of various species (Altieri, 1991). The problem with this view is that the task involved becomes a very diffuse category so much so that it involves almost all aspects of survival. Accordingly the demands for farmers rights would incorporate the political economic aspect of the very governance by any state.

It is possible that the farmers who do not maintain diversity because they produce high yielding varieties ask for compensation at par with those who do because they may claim that the lack of diversity at their farms is a consequence of conscious decisions by the state. Once the boundary of claimants is expanded, every individual or collective claim becomes weak. We do not wish this to happen. Accordingly, the intellectual property of the peasants, pastoralists, horticulturalists, fishermen and women etc., would need to be properly recognised and honoured. The fact that diversity and economic backwardness covary, what one is demanding through this argument for farmers rights is a new criterion for allocating fiscal and other physical resources to high risk low employment and low income regions from national and international agencies. The only difference is that only those communities are sought to be compensated which have maintained diversity despite all odds. Two problems may arise in operationalising such a system of compensation: a) isolation of human contribution to maintenance of diversity from the ecological contribution may not always be easy. There may be some sights inherently more diverse and not amenable to uniformity in biological endowment. The human contribution in such a case is that of refin-

ing and value adding to the existing base of diversity; Also by generating an ethic which advises stay in those disadvantaged regions having the burial grounds or cremation sites of their elders, rather than migrating away, people may have contributed to the diversity. b) the institutions for maintaining diversity may be dominated by the local power lords. Routing compensation through them may make the marginal population even more marginalised. Despite this the risk of relying on decentralised community institutions is worth taking.

(viii) The international insurance companies can underwrite the premium obligation through national companies for farmers, fishermen and women, pastoralists who maintain biodiverse farming systems. This will help cross subsidise the biodiverse systems which otherwise are poor risks and often remain out of the formal banking system. This type of insurance is similar to credit-linked insurance recommended by Gupta (1983) and implemented by central bank in India for last several years. The problem is that the farmers in high growth and low biodiversity region do not participate under this scheme and thus deprive the insurance company of transferring costs. Unless some initiative is taken in this regard, it is unlikely that much difference would be made in the situation.

The premium can be fixed by the companies on the basis of ex-situ biodiverse farms maintained per 1000 ha or 10,000 ha. Other ways can be developed on the basis of species diversity and following index so that diversity of flora and fauna is enhanced.

The estimates of the value of drugs derived from plants found in tropical rain forests in developing world have ranged from dollar 43 billion to 146.8 billion per year (McNeil & McNeil, 1989).

(ix) Legal arguments for compensation: The legal arguments about bio-diversity being a common heritage and possibility of value addition only after making huge investments in education, equipment, re-

search, infrastructure, testing of products etc., have been derived from Locke's (1690) theory of ownership. McNeil & McNeil (1989) further add that community's own investment in developing indigenous knowledge is quite large. They suggest that asymmetric transactions "may sometimes be sufficiently one-sided as to be immoral or illegal or both". They refer to the international Bill of Human Rights, Article 27 of which says, "everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which one is the author". The American Convention on Human Rights (Williams, 1981) signed but not ratified by the United States says in Article 21, "no one shall be deprived of his property except upon payment of just compensation". The property law, contract law and tort law, McNeil & McNeil observed should be applied to protect the intellectual or tangible property. Transfer of benefits ought to be set aside if unilateral mistake is established and recovery based on fraud or misrepresentation is established.

The authors after citing various property theories observe

Information which was derived by a group after generations of experience; treated by the group as important, essential, or perhaps even sacred; and useful to the group in meeting the demands of their environment would reasonably fit within the trade secret definition (McNeil & McNeil, 1989:33).

While referring to the case of constructive trust, they observe(1989:34)

This also might provide a theory of recovery, since the money acquired by the wrongdoer's actions might be seen as the product of improperly taking advantage of indigenous people "incompetent" to transact business beyond the confines of their culture.

Our conclusion is that many immoral and illegal transactions may have occurred and that the original owners of cultural information may have a just and legal claim for compensation. Perhaps more important, we need to search for new and modified institutions which will reduce the likelihood and severity of future unjust transactions and provide for a more fair distribution of wealth generated.

(x) Kloppenburg(1988) prefers a multilateral approach over market oriented competitive approach for third world countries to claim compensation for their genetic wealth. He prefers this because he fears that a market approach would generate competition among the third world countries and isolate them rather than encouraging a collaborative effort. He suggests a FAO managed International Plant Gene Fund that

would "support plant genetic conservation, construction of gene banks, and the training of plant breeders in the third world'. Money to this fund was to be paid by the advanced industrial nations which have free access to the international germ plasm banks. Size of this payment was to be determined by the "size of the national seed industry, value of the national agricultural production, and frequency and size of drafts upon the FAO's global gene bank".

While I agree with the spirit of Kloppenburg's suggestions, I have less faith in some of the multilateral UN institutions. Not only their establishment cost is extremely high but also they are often less cost effective in undertaking various training and other support functions. For instance India has trained manpower in most of the relevant fields and can provide support to most third world countries at costs which would be fraction of what it would be if FAO did the same functions. However, political interests of some of the super powers may not accommodate the idea of India or other such countries providing such a support. This contradiction becomes apparent also when one looks at the conduct of International centres of agricultural research. My preference therefore is for a multilateral institution with a low cost profile, small size and very clear ethical and professional norm of accountability to be set up in collaboration with FAO, IUCN and third world institutions. The professionals from the western countries like Kloppenburg, Warren, Paul Richards, McNeil, Wilson, Farnsworth, McNeely, Ashton, Altieri, Mollinson etc., can be involved in the structure of governance. Third World centres of expertise like ACTS(Kenya), ICAR, NBPGR(India), IIM-A, Centre For Holistics Studies, Kengo(Kenya) etc., can also be involved. The FAO, IUCN and CGIAR would need to support it through existing institutional channels. A consortium of legal experts will have to be formed to provide legal advice for TRIPS and GATT negotiations such that the issue of farmers' rights does not get obfuscated again as in past.

Part Four

Contentious Issues in IPR:

1. Should plants occurring in nature and discovered for a particular use be patented at all or patented for that use, or any other use? My contention in this paper is that those plants of which a local name exists (i.e. these have been classified for a particular purpose) and which have been subjected to selection pressure of some sort should be patented by various developing countries.

2. Can the distinctiveness of a plant variety be fully described? If yes, should the distinction be just cosmetic, or substantive? If substantive, should it be in one character, more than one character, or only in economic characters? Should the distinctiveness be identified through biometrical data, agronomic data or just a written description? Should the characteristics claimed be tested in laboratory or in farm or be accepted as claimed? I have suggested that substantive description as on date should be considered sufficient for the purpose for the time being. Detailed investigations would help in supplementary restrictions on the use of these plants for additional purposes so discovered.

3. To what extent can a breeder prevent others from using a patented variety for breeding purposes, for seed purposes for self use, or for commercial exploitation? How do we assign the proportion of returns or royalty which should accrue to developers of various parent lines from which the characters have been combined in a variety? To what extent changes in a small fraction of the chromosome entitled the breeder to claim proprietary ownership of entire genome of the plant?

In this regard, one needs more careful analysis. The modified combination of genes is like a software which is unique and derived through human effort. It needs protection but only to the extent of the new sequence of genes and thus be restricted to the specific segment of the chromosome. Same gene in another combination would still be open to use by other breeders. Thus like a programming language, the key phrases which form part of different programs can not be patented. But a definite sequence of logic can

be.

4. Whether relocation of genes within a species, variety or among species leading to production of hybrids or self pollinated varieties be considered a new discovery or invention? Or should synthesis of new genes and their incorporation in the plants be only considered a patentable activity?

5. Can the process of transferring genes be patented even if it is based on well established widely known methods?

6. Will publication of such researches be compromised or undermined if such methods could be patented to exclude others from using the same? How would the purpose of educational institutions aimed at generating universal knowledge be served if the funders were to restrict the privilege of the scientists of discussing a particular research finding in the classroom or a scientific forum?

So far, the experience is that despite commercial rewards associated with specific research studies, professional rewards still hinge to a great extent on the publication record and peer review. Till such a protocol remains, there is no case for anxiety. However, there are reports of a company sponsoring research in a publicly funded university or institute preventing the concerned researcher from sharing the information with even students. In such cases, the best course for the scientist would be to take leave and thus avoid clash of interests. But this issue also needs greater debate.

7. Will the long term growth of knowledge potentially useful for larger society suffer through excessive protection to individual innovators? If the society rewards knowledge as a common property, it would provide resources and signals for that end. The growth of 'relevant' science which keeps the engine of technology moving is possible 'only' through a peer appraised system. Thus the balancing between the interest of scientific growth and the entrepreneurial spirit of the scientists and the farmers has to be done carefully.

8. Can the concept of free exchange of germ plasm with or without cost be considered a viable, ethically and professionally acceptable function in science if products enabled by this exchange are not freely exchangeable? The argument in this paper is that biodiversity can not be held any further as a global common heritage. Some countries have already put restrictions on such movement and in any case, this is the only or major available resource with which the developing countries can negotiate with the developed countries in future.

9. How would the germ plasm banks at international centres of agricultural research account for sharing of the germ plasm with the private companies under no obligation to share the value added product with these banks? At present the companies like any other user can get any germ plasm for a very nominal sum and sometimes even free. How would farmers' rights over the germ plasm already contributed to the IBPGR (International Bureau of Plant Genetic Resources) be exercised if these were considered as part of global common heritage? The informal reports about the position of CGIAR centres on this issue should be a matter of concern to all concerned.

10. Would third world farmers like to share knowledge about new innovations were these to be patented by any company in third world or developed world without any obligation to pay any royalty? Who would fight cases on behalf of the people should such disputes arise?

I anticipate an international institutional mechanism for registering these innovations¹⁰.

11. What should be the ethical and legal framework governing Intellectual Property Right of the scientists working in public funded R&D institutions? Should multinational or national companies be allowed to appropriate breeding materials generated by scientists while working in a public institution, just by hiring

10. As a part of our international network called as Honey Bee, we have documented more than 600 innovations from Gujarat itself besides hundreds from other part of the country and the developing world. These innovations particularly in the field of botanicals i.e. plant derived pesticides and veterinary medicines can provide ideas for developing sustainable technologies for domestic and export markets. However, the creativity of farmers, artisans, pastoralists etc., requires recognition of their experimental ethic through various means mentioned earlier.

such a scientists?

Should some global convention be developed which prevents patenting of material generated from unauthorized collections(from farmers or public research institutions)? There have already been several such cases in India and frequency of such pilferage is only likely to increase in the current political economic framework.

12. Should the public sector scientists not get a royalty on the sale of seeds developed in public sector R&D institutions? Would public sector institutions have the right kind of skills and perspective for commercializing a biotechnologically or conventionally produced technology?

13. Should public agricultural research institutions be encouraged to set up joint sector subsidiaries or join with private sector institutions to commercialize sophisticated technologies? How would royalty claims of scientists engaged in a team be assessed?

14. Scientific research involves large number of scientists, technical workers and others not only for direct development of technology but also for testing the potential of the same across different locations over time. How should one apportion royalty claims of the scientists engaged in different stages of technology development?

15. If the basic characteristic of a particular variety used as a donor of that trait has been maintained by a particular community, then how should royalty be shared with that community?

16. If future supply of genetic diversity would require maintenance of biodiverse ecological regions, then how should the people who remain poor because of non destructive use of that resource be compensated?

17. If biotechnological advancements affect the export earning of a country by substituting say, naturally produced sugar by sugar synthesized through cell culture, should any international protocol govern such

losses? Or should these losses be considered as an inevitable consequence of industrial development? How should disputes be settled if it can be established that the loss took place by transferring a gene in a germ plasm/variety contributed by the loss suffering country? If such a gene had not been available, the question of its transfer to another organism for synthesis of particular compound would not have arisen.

18. Apart from making knowledge widely accessible, public institutions and scientific fora also ensure through peer culture that no disadvantageous feature of a technology remain masked or undiscussed? How should such scrutiny be conducted for environmental and human safety in the absence of public ownership of knowledge? Even in the developed countries, the case for public regulation of private Bio technological research through professionally managed bodies is being made very forcefully.

19. International trade in plant material and biotechnologies would imply new challenges for quarantine. Given limited facilities in this regard in most developing countries, how would the hazards of intentional or unintentional transfer of undesirable strains of micro organisms or plants be prevented? Indian contribution in this regard for a third world owned and managed centre can be very immense. I would not like to put my faith in CG centres for such a purpose given past experience. We are proposing through a Honey Bee network and SRISTI(Society for Research and Interventions for Sustainable Technologies and Institutions), an international initiative to protect the IPRs of grassroots innovators.

20. Under the TRIPs negotiation, the accused is required to provide evidence to prove that she has not violated the patent rights of the accuser. How would a small company or a small farmer or association thereof deal with such disputes against large companies in the developed as well as developing countries?

There is a strong case for a lawyers collective to be established by the public spirited lawyers from different countries to safe guard above interests.

21. If plant breeding rights are available for discoveries of plants grown in the wild, then the social

science research involving documentation of ethno botanical knowledge would become a means of global extraction of rent from local knowledge. What kind of professional standards and norms be set up so that in all such cases the disputes on behalf of the researched communities would be fought by the institutions hiring such scientists? Is it possible that likely cost of such litigation may generate disincentive for public support for such research?

It would be impossible for individual farmers/tribals to fight such cases of theft of their IPRs by ethno-biologists (as has been going on a global scale for years) unless public institutions were to bear legal costs of litigation on behalf of the affected party. This may require changes in the present statues.

22. Should developing countries ban any research on local knowledge which does not involve acknowledgement by name of the contribution of local innovative communities or individuals? This would imply reorientation of ethno botanical or ethno biological disciplines.

23. If maintenance of biodiversity requires constant interaction among various sources of biological variability, then how would restriction on the use of patented variety under UPOV contribute to this cause?

24. How should rights of a community or set of individuals over a particular patch of biodiversity or local land races or local selections be negotiated if an external agency, company or individual were to enter into an exclusive contract regarding use of that material? In case the terms of such contract violate the national sovereignty, where would such conflicts be resolved - in the country where from the material was taken or where the extracting agency or individual is located? How would the charge of underinvoicing be settled when no international standard for pricing an unique genetic resource may exists?

25. If a developing country like India were to patent all the germ plasm of grasses, trees, micro organisms and livestock breeds and then file cases under TRIPs as well as International Court of Justice to

prevent other developed countries from using this material without authorization, would not the western multinational companies and governments shift their ground? Would they not then agree to reduce the life of the patent and also agree to breeders' and farmers' privileges? In fact my position is that only when we bargain from a position of strength, we would be able to get the stalemate in the international debate broken.

26. If the criteria of absolute novelty is accepted for patentability, then would not a large company constrain the scope of producing such, 'novelty' in different countries by patenting their discovery or invention in each of the countries? How would information about patents be diffused so that an innovator did not waste energy in developing a product or a process already discovered and patented? To what extent alternative heuristics i.e. processes suffice for patenting to obviate this problem.

27. The disclosure requirement in most patent laws provides to society an information in lieu of which 'society' grants a fix time monopoly to the patentee. How to refuse patent if the information supplied is inadequate and cannot be used to produce same result? Earlier the patentee had to demonstrate the exact working of the technology. However, subsequently the description was considered sufficient.

28. Most developed countries during the early period of their industrialization used patent act to promote indigenous industry. Thus a patentee could loose the protection if he or she imported products similar to the once protected by the patent or used the patent to produce the product abroad. If the patent was not exploited locally for a few years the license could be forfeited.

29. In 1972, 94 per cent of the total world patents were held in the developed countries. Eighty four per cent of these patents in developing countries were owned by the multinational companies of five industrialized countries known as USA, Germany, Switzerland, U.K. and France. Only one per cent of the total world patents were held by the nationals of developing countries (UNCTAD, 1975:37-42 in Wijk, 1992). Should developing countries increase their efforts to file patents or continue to hope that the developed

countries would agree to transfer biotechnology as well as other value added products as a part of global common heritage? I consider the argument for free transfer of commercial biotechnologies meaningless in the current global trade framework. It serves no purpose to make such a demand. On the contrary, indigenous R and D and proper pricing and policing (by people of course) of local resources seems a more viable alternative.

30. It has been argued that higher the GNP per capita, higher the number of patent applications by foreigners (Greif, 1987:211). The causality in this case may be from GNP to patent applications. Given the international economic relationships, would not the trade and defence pacts affect this behaviour? In that case the patenting by the foreigners may be affected adversely if a particular developing country decides to follow a predominantly import substitution model. How do we analyse this behaviour given the complexity of historical factors? Should the number of working patents be analyzed separately from the number of total patents and would that change the inference ?

31. The developed countries argue that in the absence of IPRs, the foreign right owners did not have incentive to commit themselves to plan in the long term and develop futuristic products in a developing country. The lack of sufficient IPR, Wijk argues, might result in a 'vote of no confidence' by potential investors. However, the issue is how many countries have been able to integrate their industrial and agricultural production with the strategic interests of the right owners without losing their sovereignty? Alternatively how much of protection de facto has been exercised in the countries where high share of foreign owned patents exists. What is the future likelihood of such societies keeping up their growth potential in the absence of indigenous R&D inhibited by foreign held patents?

32. The evidence about the buoyancy in development of new technologies consequent to plant breeders' rights is not unequivocal.

At the same time, in the absence of strong patent protection the indigenous innovative potential may not

have been harnessed. Studies in US have shown that proportion of top five hundred companies in the number of patents obtained was far lesser than their weight in the output. Thus if smaller companies or organizations were likely to be more innovative, what kind of incentives for such patenting be provided? A study on Corporate Investment in Agricultural Research (Gupta and Singh, 1990) showed that smaller companies had very little incentive to subject their varieties for multi-location trials because the testing cost was prohibitive. Should not these costs be different for small and large seed or agro chemical companies or for organic products or for first time user versus repeated users etc.?

33. In many developing countries independent patent system cannot work because of lack of trained manpower, inadequate documentation and funds (Juma and Ojwang, 1989:25-26). Another problem pointed out by a local innovator of a herbal pesticide was the leakages in the patent office apart from corruption. A product to be patented would require disclosure of the entire formulation. There was no guarantee that competitors would not come to know of the formulation during the pendency of application and distort the system. How should institutional development be undertaken through involvement of professional associations and academic institutions so that the trust of the innovators in the processes of patenting can be gained?

34. Given the fact that the problems of stagnating or declining productivity are far more serious in difficult ecological regions such as drought or flood prone regions, hill areas, forest regions etc., will private investors be interested in developing technologies with limited potential for diffusion? If no, then how would problems of these regions be solved? Will reliance on public sector R&D continue to be mainstay of the developmental strategy for these regions? If biodiversity is higher in the gene rich and economically poor regions, then what kind of fiscal policies be developed so that internal transfer of resources from gene poor - economically rich regions to gene rich and economically poor regions takes place? In the absence of such policies the local populations may adopt agitational and other means preventing or restricting access of outsiders to the local genetic information and materials.

35. The linkage between trade and IPR has been emphasized by the US trade representative because of the reported business losses in US due to absence of IPRs in developing countries. However, the subsidies to the farm sector in developed countries have not been withdrawn. Likewise the protection to local industries continues to be reasonably high even in the sectors where exports from developing countries can compete. Further, the nature of consumption that changes in the duty structures of a developing country undergoing structural adjustments, may not be very conducive to regionally and socially balanced development. The IPR protection might provide incentive for certain kind of products aimed at high income categories further widening the economic disparity. Unless the linkage between trade policy, IPR and adverse balance of payment problems are carefully studied, it is unlikely that the reforms in the patent act by itself would achieve much.

The decline of pharmaceutical industry to some extent might stimulate the growth of Ayurvedic and other alternative systems of medicine. To that extent the acceptance of IPRs might do some good to trigger local development in a sustainable manner. In any case the case for protecting an industry which has not invested even a fraction of its profits in basic R and D, is very weak just on this ground. Majority of the poor people are out of the costly system of modern medicine.

Thus on industrial front, it might be worthwhile to lose in the short run so long as one can gain on the agricultural front through (a) rejection of germ plasm as a global common heritage and (b) patenting of all the land races and other known plants for all possible uses on emergency footing.

Question is whether the political institutions would demonstrate the confidence in indigenous R&D capacities in agricultural sectors (where the results have been far more impressive than in industrial sector).

The IPRs require reorganization of entire research organisations. A partnership between national companies and research institutions for developing joint sector technology companies, as said earlier, might provide answer to this problem in the short run. In the long run India would have to establish large multinational companies to provide support to other developing countries at a cost at which they can

afford and with a professional outlook which would strengthen local institutions.

India should also offer DNA finger printing technology for cataloging germ plasm of various developing countries so that in the IPR related disputes such evidence can help tilt these scales. India should screen its own germ plasm with this technology to begin with.

One should not get the impression that there is no meeting ground between the developed and the developing countries so far as IPR negotiations are concerned. Given increasing consciousness of the consumers in developed countries about health-wise and environmentally safe products, the herbal technologies have a great future. Most developing countries have neglected the local knowledge systems in this regard. Once these countries recognise the potential of this knowledge system, protect the IPRs of local committees and compensate them for maintaining biodiversity, a reorganization of research would inevitably follow. Negotiations on IPRs have so far been pursued either on moral grounds or from the position of weakness. What we have suggested in this paper is that the entire dialogue can be pursued from a position of strength.

To expect new biotechnology based companies in India to invest in R&D without any protection of IPR would be meaningless. It is natural that many of these companies will have equity participation of foreign companies. In the current economic context, such a participation is being encouraged as a part of national policy. Only way a genuine competition can take place so as to produce efficient and effective technologies is by allowing public sector R&D institutions to have either wholly owned or partially owned subsidiaries. This would also help in reducing the financial dependence of public R&D sector on the government and thereby unleash the creative potential of the competent scientists. The IPRs thus can influence the entire scientific culture and environment in a very positive manner. It is nobody's argument that absence of private interests necessarily promotes public interests. This is the minimum which one can learn from the recent global changes. At the same time one cannot assume away the public scrutiny of private as well as public R&D in sectors where environmental and ethical risks are likely to be much

more.

Intellectual Property Rights of third world scientists and the farmers need to be protected explicitly. My submission in this paper is that we should argue from a position of strength. We are one of the most gene-rich countries. We should patent all the germ plasm and develop norms for liberal access to third world countries. We should also question the concept of available diversity being a common heritage. Once we have registered our rights, we should lodge claims using DNA fingerprinting technology already developed in the country for compensation from those using these land races without authorization.

Either the developed countries will change their tracks and shift their ground. They might either offer shorter patent life. Or the context of entire negotiation may undergo a basic transformation. Room for maneuver, I assert, is available only by enforcing farmers' rights by the developing countries themselves.

Bibliography

- Armitage, Robert A. (1989), 'The Emerging US Patent Law for the Protection of Biotechnology Research Results', *European Intellectual Property Review*, 1989, nr. 2, pp. 47-57, in Wijk, 1992
- Commission of the EC (1991a), *The European Electronics and Information Technology Industry: State of Play, Issues at Stake and Proposals for Action*. DG XIII Telecommunications, Information Industries and Innovation, in Wijk.
- Commission of the EC (1991b), *Panorama of EC Industry 1991-1992*. Luxembourg, Office for Official Publications of the European Communities, in Wijk.
- DGIS (1991), *The Impact of Intellectual Property Protection in Biotechnology and Plant Breeding on Developing Countries*. Study commissioned by Directorate General International Cooperation (DGIS), Ministry of Foreign Affairs, The Netherlands, January 1991, in Wijk.
- FAO (1991) *Report of the Commission on Plant Genetic Resources* (Fourth Session, Rome, April 1991), Food and Agriculture Organization of the United Nations, Rome.
- Greif, S. (1987), "Patents and Economic Growth". *International Review of Industrial Property and Copyright Law*, 18, pp. 191-213., in Wijk.
- GATT (1991), *Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations*. MTN.TNC/W/FA, 20 December 1991, in Wijk.
- Gupta Anil K, 1991, *Sustainability Through Biodiversity: Designing Crucible of Culture, Creativity and Conscience* IIM-A Working Paper 1005, Ahmedabad, presented at International Conference on Biodiversity and Conservation held at Danish Parliament, Copenhagen, November 1991.
- Gupta Anil K. 1991, *Biodiversity, Poverty and intellectual property rights of third world peasants: A case for renegotiating global understanding*, Presented at National Workshop on Genetic Resources for Sustainable agriculture, MS Swaminathan Foundation, Madras, Nov 22-23, 1991
- Gupta Anil K, 1991, *Agricultural Biotechnologies*, IIM Ahmedabad, mimeo.
- Gupta Anil K., 1991 *Why does poverty persist in Regions of High Biodiversity? A case for Indigenous Property Right System*, IIM, Ahmedabad Working Paper.
- Gupta Anil K, 1991, *A note on Intellectual Property Rights* presented at IIM-A workshop on European Community, Ahmedabad
- Juma, Calestous (1987), *The Gene Hunters. Biotechnology and The scramble For Seeds*. London, Zed Books Ltd., in Wijk.
- Juma, C. and J.Ojwang (eds.) (1989), *Innovation and Sovereignty. The Patent Debate in African Development*. African Centre for Technology Studies (ACTS), Research Studies No.2, Nairobi, Kenya, in Wijk.
- Mansfield, Edwin (1986), "Patents and Innovation: An Empirical Study". *Management Science*, Vol.32, No.2, February 1986, pp.171-181, in Wijk.
- National Working Group on Patent Laws (1989), *Preserving the Vital Base. America's Semi-conductor Materials and Equipment Industry*. Working Paper, in Wijk.
- National Working Group on Patent Laws (1990), *Third World Patent Convention. New Delhi Declaration:*

Towards a Third World Convention on Intellectual Property Rights and Obligations (IPRO).

Nies, Helen W. (1990), "Patent Protection of Biotechnological Inventions - American Perspectives". *ICC*, Vol.21, no.4, pp.480-487, in Wijk.

OTA (1989), *New Developments in Biotechnology, 5: Patenting Life*. Office of Technology Assessment, Washington DC, in Wijk.

Primo Braga, Carlos (1990b), "The Developing Country Case for and Against Intellectual Property Protection", In: Siebeck (ed.) 1990, in Wijk.

RAFI (1989), *Farmers' rights*. RAFI Communique, Rural Advancement Fund International, October 1989, in Wijk.

Rapp, Richard T. and Richard P. Rozek (1991), "Benefits and Costs of Intellectual Property Protection in Developing Countries". *Journal of World Trade*, Vol.24, No.5, October 1990, pp 75-102, in Wijk.

UNEP (1991), *Third Revised Draft Convention on Biological Diversity*. UNEP/Bio.Div/N5-INC.3.2, 9 October 1991, in Wijk.

UNCTAD (1991a), "Trade-Related Aspects of Intellectual Property Rights: Implications for Developing Countries". In: UNCTAD, *Trade and Development Report, 1991*, in Wijk.

UNCTAD (1991b), *Transfer and Development of Technology in a Changing World Environment: The Challenges of the 1990s* TD/B/C.6/153, in Wijk.

UPOV (1991), *International Convention for the Protection of New Varieties of Plants*. Final report, DC/91/138, March 19, 1991, in Wijk.

Van Wijk, J. (1992), "The enforced introduction of a high patent standard in developing countries". *International Journal of Technology Management*. Forthcoming, in Wijk.

WIPO (1990c), *History of the Preparations of the Patent Law Treaty*. PLT/DC/5, December 21, 1990.

WIPR, *World Intellectual Property Report*, BNA, Washington D.C., several volumes, in Wijk.