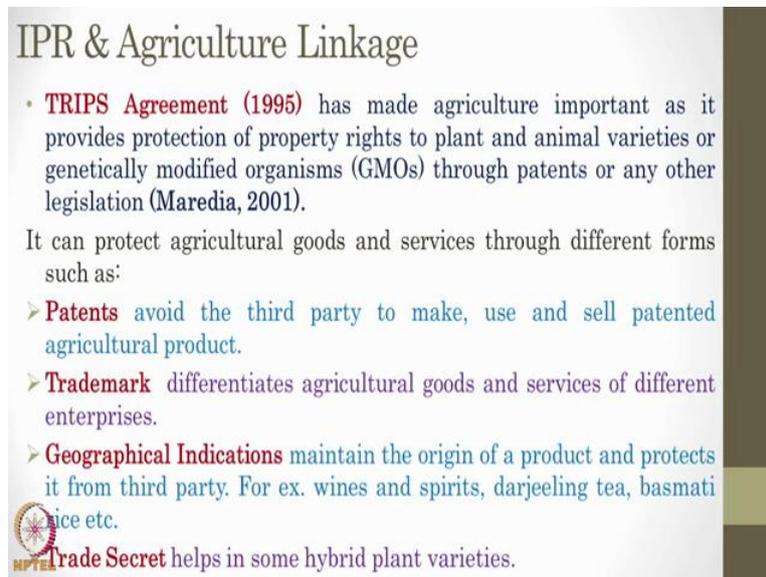


Economics of IPR
Prof. Nalin Bharti
Department of Humanities and Social Science
Indian Institute of Technology, Patna

Module - 03
Lecture - 04
Issues in Plant Varieties Protection and Biotechnology

After discussing the issues in contemporary patent, it is also important to discuss issues related with Plant Varieties Protection and Biotechnology. This particular lecture is going to first establish the link explaining the intellectual property right and agriculture.

(Refer Slide Time: 00:54)



IPR & Agriculture Linkage

- **TRIPS Agreement (1995)** has made agriculture important as it provides protection of property rights to plant and animal varieties or genetically modified organisms (GMOs) through patents or any other legislation (Maredia, 2001).

It can protect agricultural goods and services through different forms such as:

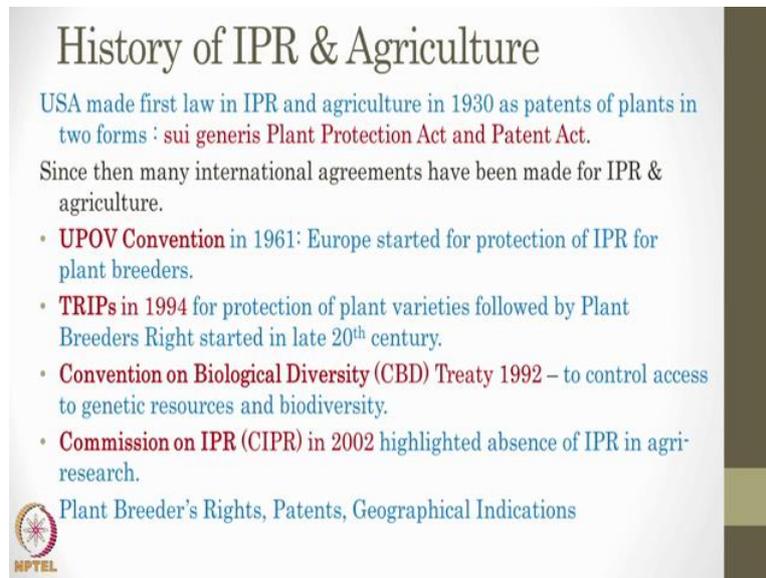
- **Patents** avoid the third party to make, use and sell patented agricultural product.
- **Trademark** differentiates agricultural goods and services of different enterprises.
- **Geographical Indications** maintain the origin of a product and protects it from third party. For ex. wines and spirits, darjeeling tea, basmati rice etc.
- **Trade Secret** helps in some hybrid plant varieties.

So, trips trade related intellectual property rights, had made agriculture important, as it was the first global agreement which provided protection of property right to plant and animal varieties or genetically modified organism through patents or any other legislation.

So, it can protect agriculture goods and services through different forms such as patents, trademark, geographical indications and trade secrets. As we have seen in case of patents which avoids the third party to make use and sell patented agriculture product. Trademark differentiates agricultural goods and services different enterprises. A geographical indication which maintains the origin of a product and protects it from third party for example, wines and spirits Darjeeling tea, basmati rice etcetera. Trade secrete also help those agricultural products in terms of hybrid plant varieties.

So, we find that TRIPS agreement has given new linkages to the agricultural sector and agricultural sector has some way how to preserve and to own certain rights of certain intellectual property.

(Refer Slide Time: 02:13)



History of IPR & Agriculture

USA made first law in IPR and agriculture in 1930 as patents of plants in two forms : sui generis Plant Protection Act and Patent Act.

Since then many international agreements have been made for IPR & agriculture.

- **UPOV Convention** in 1961: Europe started for protection of IPR for plant breeders.
- **TRIPs** in 1994 for protection of plant varieties followed by Plant Breeders Right started in late 20th century.
- **Convention on Biological Diversity (CBD) Treaty 1992** – to control access to genetic resources and biodiversity.
- **Commission on IPR (CIPR)** in 2002 highlighted absence of IPR in agri-research.

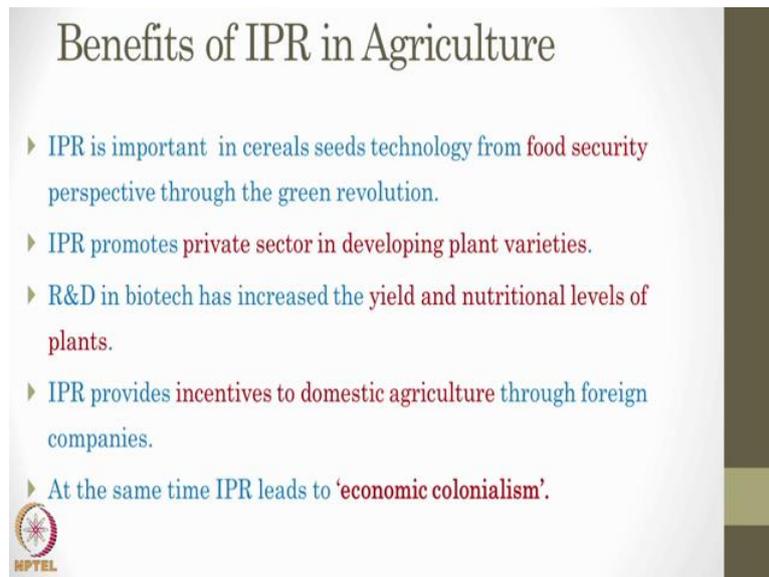
Plant Breeder's Rights, Patents, Geographical Indications



So, it was the United States which first time made the law in intellectual property right related to agriculture in 1930 as patent of plants in two forms first is the sui generis Plant Protection act and then the second Patent Act. Since then many international agreements have been made for intellectual property right and agriculture. UPOV convention in 1961 is one which really gives us a broad range of understanding that how plant breeders are also having the rights to protect its innovation. Europe started for protection of IPR for plant breeders in 1961, Trips in the last round of general agreement on tariff and trade in 1994, which was the agreement among the countries of GATT. In 1994, it was the agreement which provided the protection of plant varieties followed by plant breeder rights started in the late 20th century.

Convention of biological diversity treaty in 1992 is also important which also gives the controlling power to assess the genetic resources and biodiversity and then commission on intellectual property right in 2002 highlighted absence of IPR in agricultural research. So plant breeders rights patent geographical indications all these new terms where evolved and all these terms are the part of the intellectual property rights related to agriculture in general.

(Refer Slide Time: 04:08)



Benefits of IPR in Agriculture

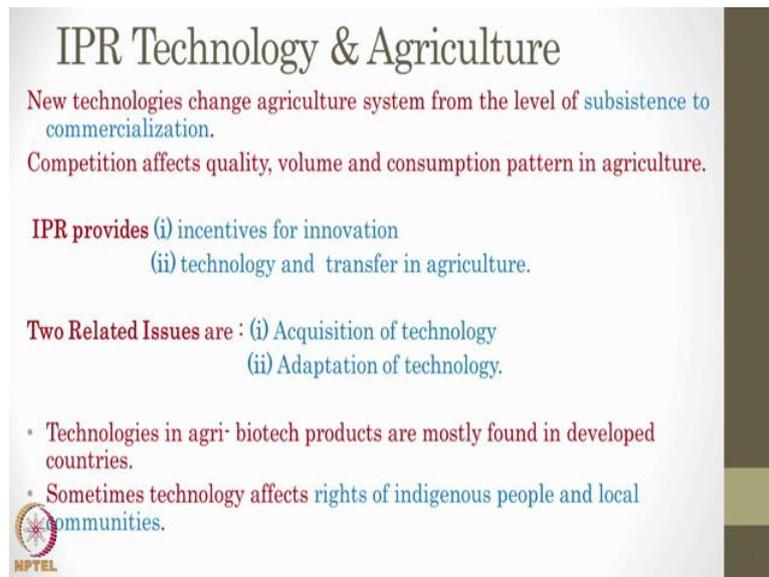
- ▶ IPR is important in cereals seeds technology from food security perspective through the green revolution.
- ▶ IPR promotes private sector in developing plant varieties.
- ▶ R&D in biotech has increased the yield and nutritional levels of plants.
- ▶ IPR provides incentives to domestic agriculture through foreign companies.
- ▶ At the same time IPR leads to 'economic colonialism'.

 NPTEL

So, what basically the benefits of intellectual property rights and agriculture because as a part of the issues involved in the biotechnology and plant variety, protection of plant variety is linked with the what benefits of intellectual property rights is having in agricultural sector, because intellectual property right is really important in serial seeds technology for the food security reason, perspective through the green revolution. It also promotes the IP rights promotes private sector in developing plant varieties. Research and Development in biotechnology increase the yield and nutritional level of the plants and intellectual property right also provides incentives to domestic agriculture through foreign companies.

We also find out that economic colonialism is laid by the intellectual property right; many critics argue that this is a new type of colonialism which is developed with the help of intellectual property rights especially in agricultural sector.

(Refer Slide Time: 05:25)



IPR Technology & Agriculture

New technologies change agriculture system from the level of subsistence to commercialization.

Competition affects quality, volume and consumption pattern in agriculture.

IPR provides (i) incentives for innovation
(ii) technology and transfer in agriculture.

Two Related Issues are : (i) Acquisition of technology
(ii) Adaptation of technology.

- Technologies in agri- biotech products are mostly found in developed countries.
- Sometimes technology affects rights of indigenous people and local communities.

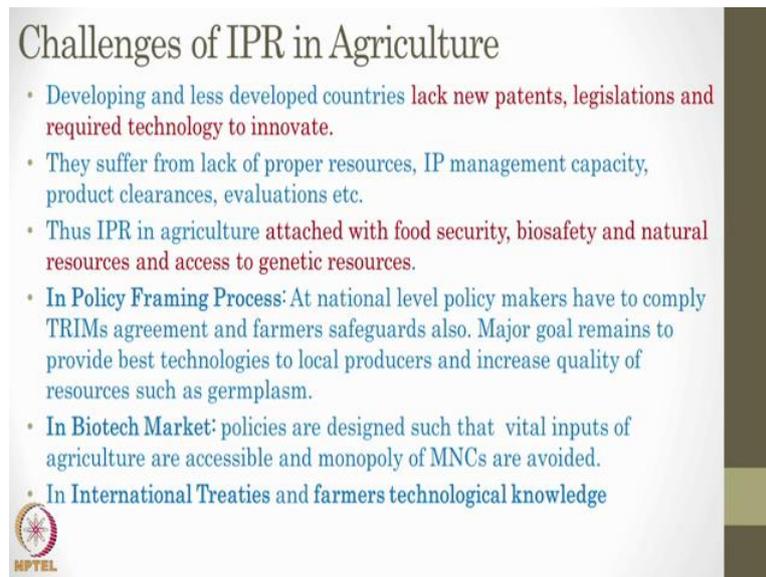


So, new technological change agricultural system from the level of subsistence to the commercialization is being seen in many countries today including some part of India we find out that, instead of agriculture is not only in especially in some of the states, where we find that it is not only the matter of survival for the farmers, but some of the farmers are really active in commercializing the agriculture.

So, there is a competitive affects quality, volume and consumption pattern in agriculture and we find that lots of commercial crops are coming up in India and in other neighboring country. So, how it happen? It happen with the help of the IPR technology and intellectual property rights forms which has really develop some of the crops, some of the seeds, some of the plants, which really motivating the new dimensions in agriculture, new productivity in agriculture and leading us to a different quality volume and consumption pattern in agriculture.

So IPR, intellectual property rights provides the incentives for innovation and it also provides the opportunity to transfer the technology in agriculture. So, two related issues one is the acquisition of technology and the second is the adaptation of technology is related with biotechnology and related with protection of plant variety in agriculture.

(Refer Slide Time: 07:18)



Challenges of IPR in Agriculture

- Developing and less developed countries lack new patents, legislations and required technology to innovate.
- They suffer from lack of proper resources, IP management capacity, product clearances, evaluations etc.
- Thus IPR in agriculture attached with food security, biosafety and natural resources and access to genetic resources.
- In Policy Framing Process: At national level policy makers have to comply TRIMs agreement and farmers safeguards also. Major goal remains to provide best technologies to local producers and increase quality of resources such as germplasm.
- In Biotech Market: policies are designed such that vital inputs of agriculture are accessible and monopoly of MNCs are avoided.
- In International Treaties and farmers technological knowledge



So technologies in biotech product are mostly found in developed countries, sometimes technology affects, rights of indigenous people and local communities as we have certain examples from many part of the world, where we are finding that certain technologies are not really taking care of the local community.

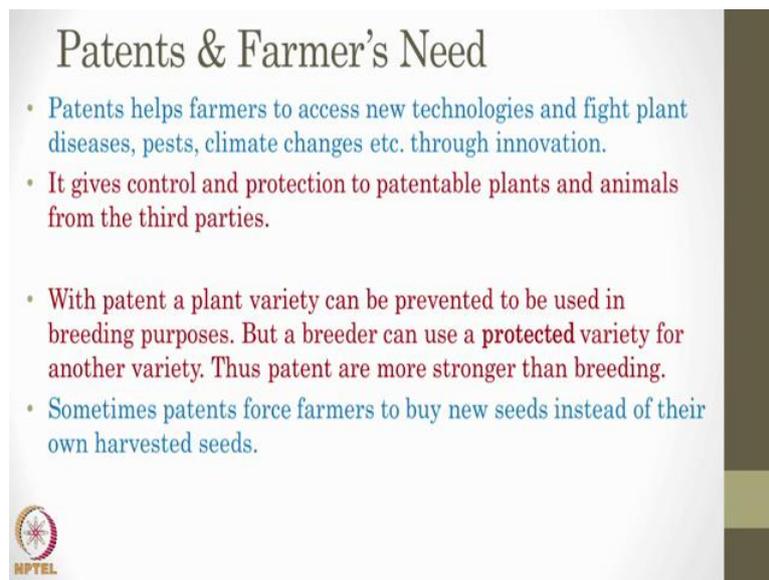
So there are certain challenges of intellectual property rights in agriculture sector. So developing and less developed countries as we know that these countries are not really countries which as more capacity to invest in R and D. So they lack in the new patents, legislations where very poor and still they are trying to resolve that issue and these countries are requiring the technology to innovate.

So due to due to certain preconditions of under development in terms of technology, these countries are suffering from suffering from the lack of proper resources IP management, product clearance and evolution etcetera. So, the intellectual property right in agriculture attached with the food security, bio-safety and natural resources and access to genetic resources in these countries.

So in policy forming framing process at national level policy, makers have to comply trade related investment measures agreement also and farmers safeguard also, when they are inviting investment especially in the biotechnology sector or in certain other sectors, they have to be very much sensitive because the major goal remains to provide best technology to local producers and increase quality of resource such as germplasm.

So in by biotech market policies are designed, such that vital inputs of agriculture are accessible and monopoly of multinational companies are avoided. So international treaties and farmers, technological knowledge are complimenting in some country, but not complimenting in many country, especially less developed countries and other developing countries are not in the position to get the compliment treaty of the international treaties for the farmers technological knowledge.

(Refer Slide Time: 09:53)



Patents & Farmer's Need

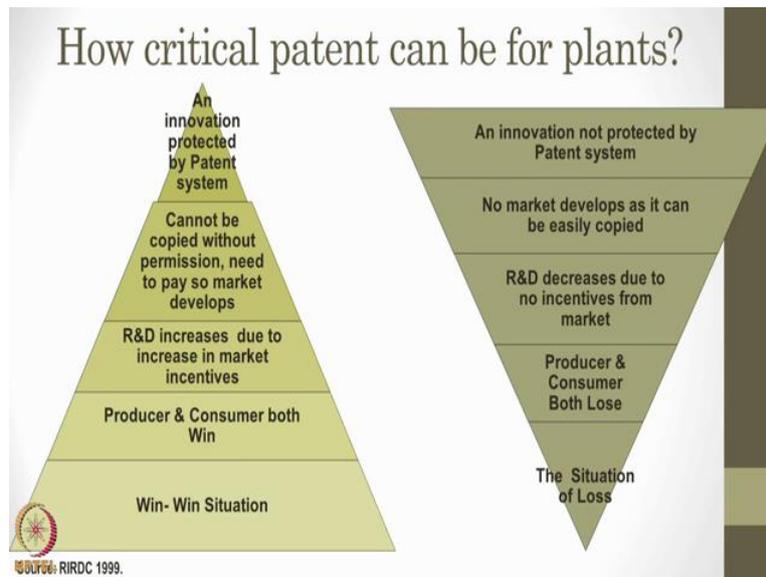
- Patents helps farmers to access new technologies and fight plant diseases, pests, climate changes etc. through innovation.
- It gives control and protection to patentable plants and animals from the third parties.
- With patent a plant variety can be prevented to be used in breeding purposes. But a breeder can use a protected variety for another variety. Thus patent are more stronger than breeding.
- Sometimes patents force farmers to buy new seeds instead of their own harvested seeds.



So what are the farmers need because we do find that patent help farmers to access new technologies and fight plant diseases and pests and climate changes etcetera through innovations and it gives control and protection to the patentable plants and animals from the third parties, but with patents, a plant variety can be prevented to be used in breeding purpose, but a breeder can use a protected variety for another variety thus patents are more stronger than the breeding.

So, sometimes patents force farmers to buy new seeds instead of their own harvested seeds. So, these are the new challenges for the farmers and whether the farmers are really having a clear cut control on the on the seed which they want to cultivate for the next crop, which they want to use for the next crop that is against one of the measure issue.

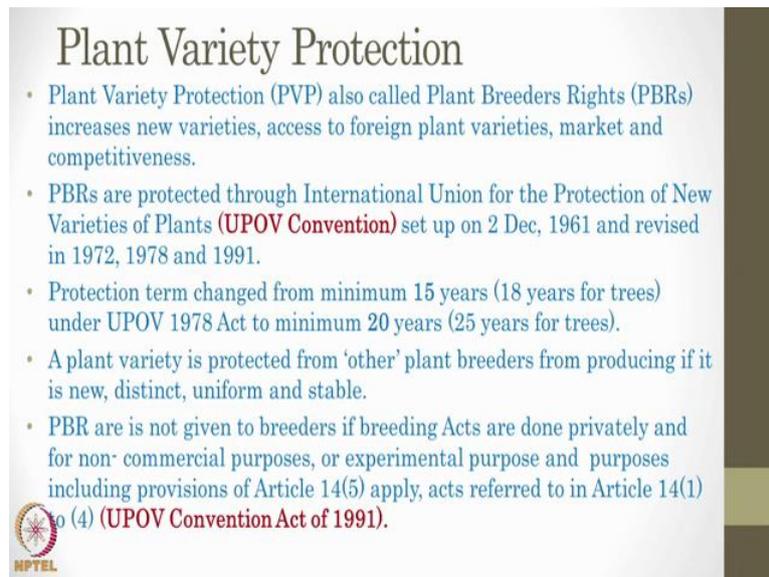
(Refer Slide Time: 10:51)



So, how critical patent can be for the plants? So, one side is the is the condition when the innovation protected by plants patent system, which cannot be copied without permission need to pay, then only market can be developed, R and D increases due to increase in the market incentives producers and consumers both are having the win situation because especially when the consumer is having the capacity to pay and if innovations are leading them to the new consumerism in the in the set of new consumer goods, then the consumers are really happy and as well as the producers are really happy, but the other part of this plant variety protection. When the an innovation not protected by the patent system no market develops at it can be easily copied R and D decreases due to the no incentive from the market and producers and consumers both are losing and the situation of loss occurs .

So, it is important to really patent or really have to intellectual property of the plant varieties because in absence of such plant varieties, there is not any incentives for the society to really control the varieties available with them and so there are chances for easily copying those plant varieties by others and all depends on the what type of investment capacity a country is having or what type of forms or other (Refer Time: 12:37) a country is having they can really acquire the genes and they can use really the biotechnology to evolve a new product and they can really patent and they can get incentive because they are the real producers and they can again find out the consumers, since they have the patent right they can find out the consumers not in one country, but many country.

(Refer Slide Time: 13:06)



Plant Variety Protection

- Plant Variety Protection (PVP) also called Plant Breeders Rights (PBRs) increases new varieties, access to foreign plant varieties, market and competitiveness.
- PBRs are protected through International Union for the Protection of New Varieties of Plants (UPOV Convention) set up on 2 Dec, 1961 and revised in 1972, 1978 and 1991.
- Protection term changed from minimum 15 years (18 years for trees) under UPOV 1978 Act to minimum 20 years (25 years for trees).
- A plant variety is protected from 'other' plant breeders from producing if it is new, distinct, uniform and stable.
- PBR are is not given to breeders if breeding Acts are done privately and for non-commercial purposes, or experimental purpose and purposes including provisions of Article 14(5) apply, acts referred to in Article 14(1) to (4) (UPOV Convention Act of 1991).

NPTEL

So plant variety protection also called plant breeder rights increase new varieties access to foreign plant varieties market and competitiveness. Plant breeder's right protected through international union for the protection of new varieties of plants, set up on 2 December 1961 and revised in 1972, 1978 and 1991. Protection term changed from minimum 15 years 18 years for trees under UPOV 1978 Act to minimum 20 years and 25 years for trees.

A plant variety is protected from other plant breeders from producing if it is new distinct uniform and a stable. Plant breeders rights are is not given to the breeders, if breeding acts are done privately and for noncommercial purpose or experimental purpose and the purpose including provisions of article 14 5 which apply acts refer to in article 14 1 to 4 in the UPOV of convention act of 1991.

So, plant variety protection has new plant variety is generated, it is applied for the plant variety protection then it is licensed to it later which gives the loyalty, this loyalty again generates new income, which is invested in the further R and D activity, so private forms play important role in commercializing the plant breed varieties.

(Refer Slide Time: 14:58)

Plant Variety Protection (PVP)

- As new plant variety is generated it is applied for Plant Variety Protection. Then it is licensed which later gives royalty. This royalty again generates new income which is invested in R&D for breeding of new varieties.
- Private firms play important role in commercializing the plant breed varieties and research work.
- Under Genetic Use Restriction Technologies (GURTS) which includes many forms to control actions of genes in plants – 'terminator' technology is introduced. Here seed sterile prohibits to grow second crop.

Some of the protected breed varieties are:

- China - Peony variety 'Yiengxue', Rice variety – 'Yangdao 6'
- Argentina – 'Estrella' flower
- Kenya – 'Amy' plant
- Kenya – 'Betsy' and 'Line 10' – under review
- Poland – 'Polish race' of gerbera, 'Ikar' and 'Hinga' potato,
- Poland – 'Julia' flower, 'Alka' tomato
- Republic of Korea – 'Ipum' and 'Yangjo' rice, 'Bora' leaf vegetable, 'Chunpoong' roots
- Republic of Korea – 'Red Angel' rose
- Netherland – 'Little Angel' rose etc.



And research work under genetic use and restriction technologies, which includes many forms to control actions of the genes in plants. We are finding that China, Kenya, Poland, Republic of Korea or Nether land are some of the examples which has already protected some of the some of the plants and this shows that some of the countries are really sensitive to have this plant variety protection.

(Refer Slide Time: 15:26)

Biotechnology & IPR

Major questions are:

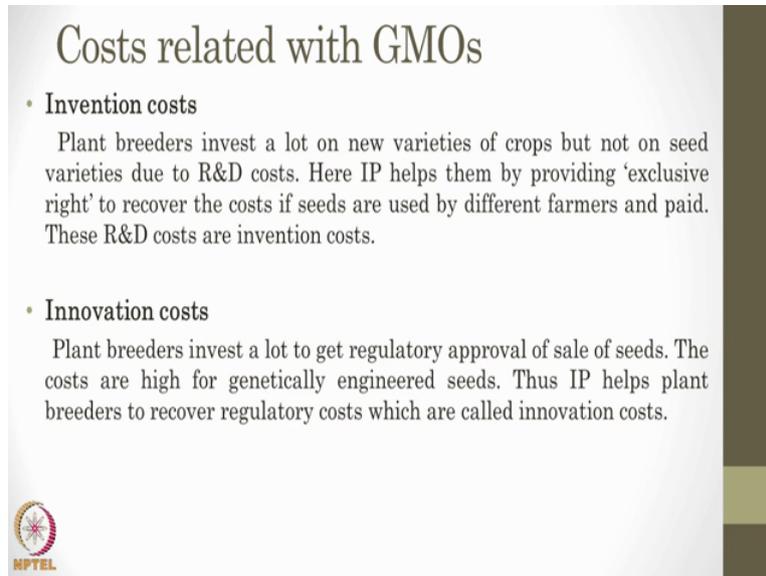
- ❖ Should private sector be allowed to explore potential of biotechnology for developing countries ?
- ❖ Can innovations and accessibility issue be solved by IPR through R&D?



But two important questions which comes here is should private sector be allowed to explore potentials of biotechnology for developing countries and can innovation and accessibility

issue be solved by intellectual property right through R and D.

(Refer Slide Time: 15:51)



Costs related with GMOs

- **Invention costs**
Plant breeders invest a lot on new varieties of crops but not on seed varieties due to R&D costs. Here IP helps them by providing 'exclusive right' to recover the costs if seeds are used by different farmers and paid. These R&D costs are invention costs.
- **Innovation costs**
Plant breeders invest a lot to get regulatory approval of sale of seeds. The costs are high for genetically engineered seeds. Thus IP helps plant breeders to recover regulatory costs which are called innovation costs.



So, to answer this questions, we have to see the invention cost and innovation cost included by the genetically modified organizations and these organizations are really putting hard, to develop a develop a new types of crop, new type of seeds, new type of plant and in that case a huge cost is involved by the private parties and since the private parties are investing a lot. So, they want return because ultimate goal from such activity is to make profit.

(Refer Slide Time: 16:25)



Are Monsanto 'suicide seeds' for India

- Monsanto a US based agriculture company which sells leading seeds brands, technology, herbicides etc. across countries entered India in 1988
-
- India started using GM seed in cotton in 2002.
- Monsanto introduced *Bt technology* in India in 1990s and was officially approved in 2002.
- It has gained monopoly in seeds and led to debt trap, royalty extraction, monoculture in cotton and farmers resulting suicides in cotton belts.
- Vandana Shiva (2013) called it '*suicide seeds*' as since its coming, about 3 lakh Indian farmers have committed suicide due to failure of Bt cotton.

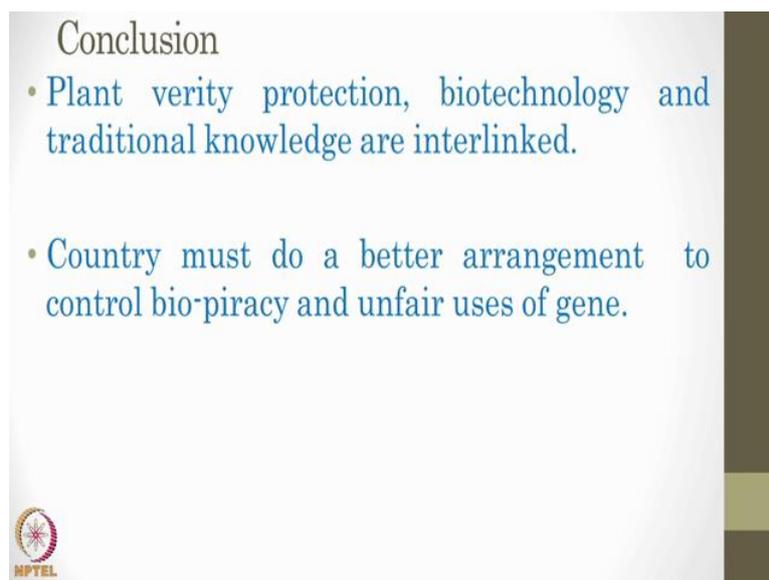


So, in case of India if we see the recent scenario in India, especially Monsanto a US based

agriculture company which sells leading seeds brands, technology, hybrid etcetera across countries that entered in India in 1988 and India started using GM seeds in cotton in two 2002.

So Monsanto introduced BT technology in India in 90s and was officially approved in 2002; IIT as gained monopoly in seeds and lay to the trap royalty, extraction, mono culture in cotton and farmers resulting suicide in cotton bills. Vandana Shiva called it suicide seeds as since it is coming about 3 lakh Indian farmers have committed suicide due to failure of BT cotton. So, this is one of the issue with the with the current set of commercialization of agriculture and the current set of seeds available to the developing countries because all the seeds needs proper irrigation facility, proper care and which many farmers are not in the position to really sustain in a country like India.

(Refer Slide Time: 17:51)



Conclusion

- Plant variety protection, biotechnology and traditional knowledge are interlinked.
- Country must do a better arrangement to control bio-piracy and unfair uses of gene.

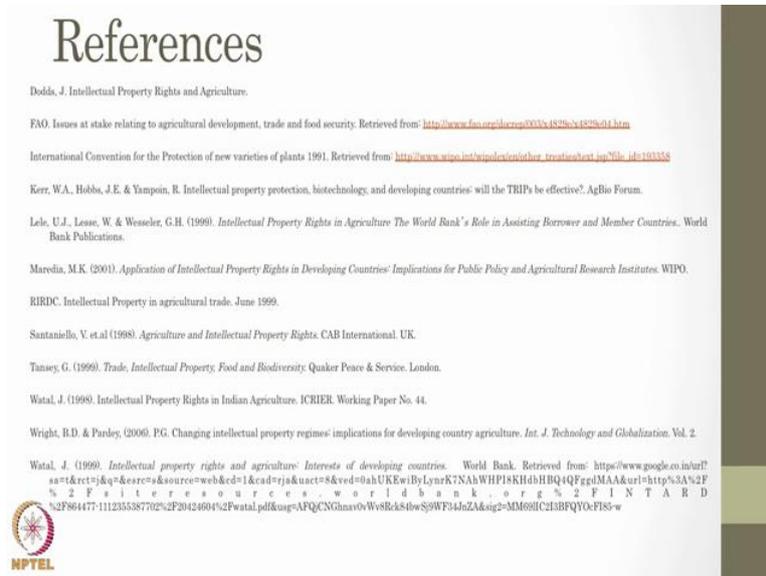
NPTEL

This Plant Variety Protection, biotechnology and traditional knowledge we will again have a separate discussion on issues related to traditional knowledge, but in some case like in case of patent we have seen that neem and also the turmeric example and also the basmati rice example. Is not far away from the traditional knowledge network, we find out the plant variety protection biotechnology and traditional knowledge are interlinked.

So, country must do a better arrangement to control by biopiracy and unfair usage of genes and if a country is really failed in a protecting the biopiracy, stopping the biopiracy and unfair use of genes then there are many firms many countries available many organizations and

multinationals are available in the world to really capture the opportunity to get certain genes and certain biomaterials, which can be further used to produce a new variety of plants and seeds and which can really monopolize the world in a different way.

(Refer Slide Time: 19:06)



So, with this discussion I hope that, you will be in the position to understand that how plant variety protection is important and why some of the countries has adopted a very exclusive or you can say a very especial form of protection that is named as a Sui Generis System of plant variety protection.

So, with this note I must conclude that, as a part of intellectual property rights the traditional knowledge or the biotechnological products and the plant varieties are interlinked and it needs further attempt to protect especially in the bio rich country like India.

Thank you.