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Protection of Traditional Agriculture Knowledge and Food Security in Developing Countries: A Critical Analysis

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Abstract: *The developed as well as the developing countries in the world have traditional knowledge, expertise, skills and practices related to food security and agricultural production. The protection of traditional agriculture knowledge is an important issue as it helps to ensure food and agricultural diversity, livelihoods and food security. This research paper contains various perspectives to identify the role of traditional knowledge in agriculture as well as the issues regarding seed and food security. It also tries to find out why and how traditional agriculture knowledge can be protected and discuss a few international forums where such issues are dealt with. The paper also considers the challenges and opportunities for the protection of traditional agriculture knowledge in rural areas of developing countries, with a specific focus on Bangladesh.*
Keywords: *Protection, Traditional Knowledge, Agriculture, Food Security, Developing Countries*

I. Introduction

In both developed and developing countries all over the world, farmers, indigenous and local communities have traditional knowledge, expertise, skills and practices relating to food security and to food and agricultural production and diversity. Traditional farming, fishing, herding, foraging and forestry are based on long established knowledge and practices that help to ensure food and agricultural diversity, valuable landscape and seascape features, livelihoods and food security.

In recent years, the protection of traditional knowledge has received increased attention in various international forums, including the Convention on Biological Diversity (CBD), the World Intellectual Property Organization (WIPO), the International Labour Organization (ILO), the Food and Agriculture Organization (FAO), the World Health Organization (WHO), the UN Educational, Scientific and Cultural Organization (UNESCO) and the UN Commission on Human Rights. However this research paper will discuss a few of them in relation to traditional agricultural knowledge.

II. The Role Of Traditional Knowledge In Agriculture And Food Security

Traditional knowledge (TK) plays an important role in the field of agriculture in the developing countries. Agriculture is mostly related to food security of a country, but before going to the main issue a very brief definition of traditional knowledge is necessary. TK includes the knowledge, innovations and practices of indigenous and local communities around the world which is derived from experience gained over the centuries. It can be derived from diverse and unusual sources like stories, songs, folklores, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds.

Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry. There is a growing appreciation of the value of traditional knowledge. This knowledge is valuable not only to those who depend on it in their daily lives, but to modern industry and agriculture as well. Many widely used products, such as plant-based medicines and cosmetics, are derived from traditional knowledge. Other valuable products based on traditional knowledge include agricultural and non-wood forest products as well as handicrafts.

TK plays an important role in resource management which includes agricultural and environmental manipulation. Now a days it has been largely focused on indigenous peoples and their rights, broadening the scope to agriculture, food security, renders TK an issue of interest to farming communities around the globe. Modern biotechnology in breeding of plant genetic resources may be complemented by deliberate policies to support the use and conservation of traditional plant genetic resources. TK is associated with "niche" rather than with "mass" production. It therefore fosters diversity and contributes to the preservation of natural resources. Appropriate policies should serve the purposes of both supporting niche products, and by doing so, also of supporting biological diversity and thus food security. As scientific breeding tends to limit resources and crops

available, the protection of TK in the field of agricultural plant genetic resources offers the potential of appropriate flanking policies.

III. The Issues Regarding Seed And Food Security

3.1 General issues:

Agricultural extension and research would need to accept the need TK's for innovative capacity and farming activities with modern scientific knowledge to help increase the effectiveness of TK-based farming and food production systems for the food security of the developing countries. However, the value of this material (e.g. farmers' varieties and land races, local water capture methods, companion planting practices and use of these in the modern food system) may well be completely undercut by the expansion of industrialized approaches to farming and developments in biotechnology.

The introduction of patent system in agriculture raises many controversial issues. The objection against the patent is that if the patents are allowed to stand then the indigenous populations around the world will be excluded from freely using many of the natural resources that have been carefully developed and nurtured by them for over hundreds of years. 'Patenting seed' is one of the controversial issues in the field of agriculture and food security. As we know seed is firstly linked with food and food crisis has its roots in changes in the seed supply system, and the erosion of seed diversity and seed sovereignty. This seed sovereignty includes the farmer's rights to save, breed and exchange seeds, to have access to diverse open source seeds which can be saved and which are not patented, genetically modified, owned or controlled by emerging seed giants.

The patent protection for seed is difficult for developing countries as the livelihood of the farmers will be at stake and also fatal to them. It is because the price of patented seed will increase and the farmers could never use that seed for agriculture purpose. As a result the natural base of the food system is likely to be superseded and the issue of food security will become more complicated.

3.2 Specific issues:

Another critical issue is genetically modified (GM) seed. The integration and corresponding impacts pose danger to individuals and environment. There is increasing evidence from the UN and WHO that a strong causation exists between the adoption of GM seeds and environmental degradation, including deforestation. Most research shows a decrease in biodiversity with the introduction of GMOs. This means using GM seeds may actually make agricultural conditions worse than they are presently, not to mention the added threat to the health of humans, insects, and animals.

The genetically modified (GM) crop which is inefficient at helping farmers or improving food security in the developing world as high economic costs associated with using industrial agricultural methods. Effectiveness of GM seeds to increase crop yield has been repeatedly refuted, along with the economic feasibility of their use. In 2010 GM seed giant Monsanto discovered their seed Bollgard 1 was no longer effective at eradicating the pest 'bollworm' that threatens the crops of cotton farmers in India. The bollworm pest developed a resistance to the technology that only a year earlier was deemed a significant technological success by the Union Science Minister. Monsanto responded by creating a new seed, Bollgard 2, and recommending the increased use of pesticides at a higher price to the consumer.

This situation proved two points: that GM seed modifications are unreliable and can cause further issues in the long term; and that the cyclical trend of pest resistance necessitates the ongoing development of new, costlier seeds which can trap farmers in the GM web. It is easy to see how this cycle leaves farmers deeply in debt after spending so much money on the seeds and necessary additives. The cost to mitigate and sustain GM seeds has historically led numerous farmers into deeper poverty, as they require expensive fertilizers and pesticides.

Furthermore companies that produce GM seeds prohibit seed saving, a process that small farmers have relied upon for centuries to generate income and ensure livelihoods. Recent advancements have also allowed Monsanto to now genetically modify seeds to self destruct after one season, preventing farmers from saving seeds from their crop to plant next year and instead requiring them to return to Monsanto for new seeds every year. The hardest hit economically by GM use is the farmers most willing to support the corporations that advertise the benefits of their use. This occurs when farmers enter into deals with GM seed corporations without knowledge, understanding and awareness of the plethora of social, economic and environmental costs.

3.3 The need for innovation and food security right:

The challenge of securing the world's food supply calls for further research and incentives to develop innovative agricultural solutions. The evolution of the right to food is derived from the larger human right to an adequate standard of living contained in the 1948 Universal Declaration of Human Rights (UDHR). Article 25 (1) of UDHR asserts that, 'Everyone has the right to a standard of living adequate for the health and wellbeing of himself and of his family, including food, clothing, housing and medical care and necessary social services

...' The International Covenant on Economic, Social and Cultural Rights (1966) developed these concepts more adequately, stressing 'the right of everyone to … adequate food' and specifying 'the fundamental right of everyone to be free from hunger'.

To ensure global food security, agricultural innovations need to be affordable and farmers need an incentive to adopt them. In summary, the economic benefit of using modern technologies needs to outweigh their cost. The first step towards ensuring food security is to accept that it is an extension of the fundamental right to life. The right to food is not just a basic human right; it is also a basic human need. Awareness among the people with regard to their right to food can escalate the process of equitable distribution and thus help to realize the right to food for all citizens. Also developing countries need to improve agriculture system to make food crops more affordable for the poor.

IV. Protection Of Traditional Knowledge In Agriculture:

Most of the agricultural practices, particularly in developing countries stem from indigenous and traditional knowledge systems, rarely documented. They are extremely valuable for the sustenance of those practices and ensuring food security for large populations. Various national governments and national and international non-governmental organizations have been working on developing a fair and equitable system to protect traditional agriculture knowledge which is essential for food security, but nothing of substance has emerged so far.

Intellectual property protection can be categorized as defensive (preventing others from seeking IPR to one's TK) or positive (establishing IPR to one's TK, with the resulting possibility of preventing others from using the TK without permission). For both types of protection, there have been cases where TK holders have been able to use conventional IPR instruments to protect their TK. However, since these instruments were not developed with TK in mind, but rather modern industrial intellectual property, the fit is not always perfect. For TK holders, most of whom have quite limited resources, enforceability of IPR will always be a major problem. This fact must always be borne in mind when designing TK protection systems.

4.1 Why protect traditional knowledge (TK)?

Apart from treaties and emerging international norms, which imply both legal and moral imperatives for protecting TK, there are a number of reasons why developing countries may feel motivated to protect it.

4.1.1 To protect traditional agriculture and food security

Indigenous and local communities have an intimate knowledge of many aspects of their surroundings and their daily lives. Over centuries people have learnt how to grow food and preserve and to survive in difficult environments. They know what varieties of crops to plant, when to sow and weed, which plants are poisonous, which can be used for control of diseases in plants, livestock and human beings. So protection of TK is needed for the development of agriculture and food production system.

4.1.2 To improve the livelihoods of TK holders and communities

TK is valuable first and foremost to indigenous and local communities that depend on TK for their livelihoods and well-being, as well as for enabling them to sustainably manage and exploit their local ecosystems (e.g. through sustainable low-input agriculture). The World Health Organization (WHO) has stated that 80 per cent of the world's population depends on traditional medicine for its primary health care and that TK is indispensable for its survival (UNCTAD 2000). TK is increasingly accepted as an important source of information useful for achieving sustainable development and alleviating poverty.

4.1.3 To benefit national economies

TK benefits national economies and has the potential to benefit them still further. Such TK based products as handicrafts, medicinal plants, agricultural products, and non-wood forest products are traded in both domestic and international markets and can provide substantial benefits for exporter countries. In the long term, this will reduce industrial interest in natural product research for food, agriculture and health, as well as associated TK.

4.1.4 To conserve the environment

That a conservation ethic is a prevalent feature of the subsistence and resource management practices of many present-day indigenous or native peoples and traditional communities is supported by a large number of field studies (e.g. Bodley 1976; Clad 1984; Martin 1978; Reichel- Dolmatoff 1976). Several academic studies on traditional communities provide sufficient evidence that the protection of TK can provide significant environmental benefits. The traditional communities maintain the centre of crop genetic diversity, which include

the traditional cultivars, or land races, that constitute an essential part of the world's crop genetic heritage and non-domesticated plant and animal species.

4.1.5 To prevent biopiracy

The issue of biopiracy has become highly contentious and seems to have played a catalyzing role in the introduction of access legislation in some developing countries. The term "biopiracy" was coined by the North American advocacy group 'Rural Advancement Foundation International' as part of a counterattack strategy on behalf of developing countries that had been accused by developed countries, particularly the United States, of "intellectual piracy". It normally refers either to the unauthorized extraction of biological resources or associated TK from developing countries, or to the patenting, without compensation, of spurious "inventions" based on such knowledge or resources.

V. TK and Developing Countries

Traditional agriculture knowledge plays an important role in vital areas such as food security as well as agriculture mostly in the developing countries. However, many developing countries were for a long time indifferent towards the value of TK. In the low-income sectors of agriculture it often has led to stagnation and invariably, to the loss of TK as structures changed. There are also those developing countries, namely India, Bangladesh, Nigeria, which consider the protection of TK as an issue within the broader debate on food security. They also maintain that if TK–based agriculture is shielded off from global trading rules, developing countries retain their "food production capacity", (either through the special safeguard mechanism or via countervailing duties) and food security of developing countries would be enhanced.

5.1 Doha Declaration on Traditional Knowledge (2001):

The Doha Declaration of 2001 introduces TK as an item for work on intellectual property. The WTO developing country members intend to ensure that developed countries should recognize TK, give more consideration for developing countries' needs in installing an effective IPR protection consistent with the TRIPs. Also, they seek to increase the demand in both developing and industrialized countries for traditional crops. But also certain industrialized countries felt pressure from the Cairns Group and certain developing countries to liberalize their agricultural trade, advocate that the special form of protection through GIs should be expanded to all agricultural products.

5.2 Traditional Knowledge on Plant Genetic Resources (PGR):

Since TK encapsulates information about plant genetic resources, scholars associated the idea with international intellectual property protection (IPRs). Eventually, this approach has made its way into discussions relating to the World Trade Organization's (WTO) Agreement on Trade-related Intellectual Property Rights (TRIPs) and the World Intellectual Property Organization (WIPO). The WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore values TK for its contribution to new cures for globally important disease or for ensuring the food security of a region during a drought. WIPO also acknowledges that TK on plant genetic resources raises questions of distributive justice between the TK holder and the multinational company reaping the benefits from patenting the use of the information about the genetic resource. Yet, under contemporary international law, the state has full jurisdiction over the genetic resource. It can sell the resource to a user by a contractual arrangement, unless the genetic resource qualifies for a public good by being listed in a databank. No international legal protection is yet in place to effectively empower TK holders with the legal means to defend his/her know-how against misappropriation and unfair competition.

5.3 Traditional knowledge in the WTO:

The Ministerial Declaration of the WTO's Doha Fourth Ministerial Conference November 2001 emphasized the importance of this issue. It instructed the Council for Trade-Related Aspects of Intellectual Property Rights (TRIPS) "to examine, inter alia, the relationship between the TRIPS Agreement and the Convention on Biological Diversity, the protection of traditional knowledge and folklore, and other relevant new developments raised by Members pursuant to Article 71.1 of the TRIPS". In addition, it instructed the Committee on Trade and Environment, in pursuing its work on all items on its agenda, to give particular attention to three issues, including the relevant provisions of the TRIPS Agreement.

The TRIPS Agreement sets out minimum standards for a number of IPR instruments (patents, trademarks, copyright, etc.) to protect industrial type intellectual property. This type of knowledge is predominantly held in developed countries. The nature of traditional knowledge is much more difficult to protect using the conventional IPR instruments required by the TRIPS Agreement. Thus there exists an imbalance whereby the knowledge predominant in developed countries is protected, while that predominant in

developing countries is not. The developing countries have repeatedly sought to amend the TRIPS Agreement so that applications for patents relating to biological materials or to TK would provide, as a condition to acquiring patent rights, (a) disclosure of the source and country of origin of the biological resource and of the TK used in the invention; (b) evidence of prior informed consent through approval of authorities under the relevant national regimes; and (c) evidence of fair and equitable benefit sharing under the national regime of the country of origin. This would provide a legally binding defensive protection against "bad patents" based on misappropriation of genetic resources and TK, and would facilitate benefit sharing. In the medium term, this could be complemented by other measures, such as searchable databases of TK in the public domain to assist patent examiners in determining the existence of prior art.

5.4 Traditional knowledge (TK) and the International Union for the protection of New Varieties of plant, 1991 (UPOV Convention):

The UPOV Convention is an international convention dealing exclusively with the protection of new plant varieties and is silent on the subject of TK and genetic resources. However, it should be noted that the Convention does not forbid the granting or creation of rights in respect of TK, or categories of plant material that are not plant varieties protected under the Convention. UPOV member States are free to establish special systems for protecting TK as long as these do not conflict with the UPOV Convention.

5.5 Protection of TK by plant variety protection systems:

The subject matter of plant variety protection **(**PVP) is the plant variety itself. The variety must exist physically in order to be protected. Knowledge does not frequently exist physically and for that it is not suitable for being given protection under the UPOV system. All new varieties meeting the criteria of distinctness, sufficient uniformity, stability and novelty are protectable. However, new varieties developed by indigenous communities or farmers using TK, which have a fixed identity when reproduced in many cases if meet the UPOV criteria then in such case they can be protected under the Convention. The process of applying for PVP is relatively simple and is normally completed by applicants themselves without the help of legal specialists. As a result, the transaction costs incurred in applying and registering for PVP are reasonably low, which facilitates applications from small plant breeders, individual farmers and local communities.

5.5.1 Importance of establishing an effective plant variety protection system for the development of agriculture:

As the world's population is increasing especially in the developing countries, the demand of food is also increasing and therefore food security must be ensured as a right to life. The continuous development of improved plant varieties is of high priority in striving to meet this demand. The establishment of an effective plant variety protection system is indispensable to promote breeding activities by giving private breeders enough incentive to invest money and time for breeding, particularly at a time when substantial increases in public investment in breeding are unlikely. The experience of UPOV member States has shown that plant variety protection increases the number of breeders and varieties, and consequently widens the range of improved varieties available to farmers, with a potential increase in genetic variability. Over 100,000 new varieties have been protected under the UPOV system since it was first introduced. At present, over 50,000 varieties are protected. Some 5,000 new varieties are granted protection in UPOV member States each year.

Farmers clearly benefit from the supply of new, improved varieties resulting from the establishment of a plant variety protection system. While the need to increase respect for traditional knowledge is recognized, this objective should be addressed without jeopardizing the effectiveness of plant variety protection systems and impeding the progress of breeding.

VI. Traditional Agriculture Knowledge In Bangladesh

Bangladesh is primarily an agriculture based economy. Agriculture is the single largest producing sector of the economy since it comprises about 18.6% (data released on November, 2010) of the country's GDP. In Bangladesh many people earn their living from agriculture. Although rice and jute are the primary crops, wheat is assuming greater importance for the food security. So the protection of traditional agriculture knowledge is very important for the country to improve food security.

6.1 The effect of modernization in agriculture:

The effect of modernization in agriculture started when modern varieties of rice are introduced in the field of agriculture to ensure food security. Although initially the productivity increased rapidly but the problems have also began to emerge. These include loss of soil fertility, low organic matter content in the soil (more than 60 per cent of the soil has less than 1.5 per cent of organic matter), low levels of nitrogen in almost all soil types, and deficiency in phosphorus, zinc, sulphur, boron and other substances. The use of chemical

fertilizers is another major problem as it creates nutrient imbalances. In most of cases fertilizers applied to the soil are the phosphorus and potassium but excessive nitrogen is also applied in some cases which leads to nutritional imbalances as well as acute depletion of nutrients in the soil, particularly in intensively cultivated areas. Deforestation, inappropriate cultivation practices and low organic matter content in the soil contributes to soil erosion, which in turn leads to sedimentation in downstream rivers, lakes and other bodies of water. This results in flash floods and reduced soil productivity. Another problem in agriculture is genetic erosion from the introduction of modern varieties of crops. In the early 1960s there were some 8,500 cultivars of rice alone; their numbers have now been reduced to only a few dozen.

6.2 The scope of traditional knowledge in agriculture in Bangladesh:

A plurality of Bangladeshis earns their living from agriculture. Although rice and jute are the primary crops, wheat is assuming greater importance. In this agrarian society, farmers have relied on traditional knowledge for agriculture as well as food security and this practice is done mainly for the reasons such as there are not enough varieties or their seeds, traditional varieties' low input requirements, their adaptability to specific ecological niches (e.g. deep-water rice, salinity-tolerant varieties of crops), their resistance to pests, their specific qualities (e.g. finer grain or aroma, specific flavours). It is important to note that traditional varieties suit subsistence farming, which is still the backbone of agriculture in Bangladesh.

Now a days, farmers are trying to educate themselves about modern farming knowledge but they have not abandoned their traditional knowledge (TK). It is because farmers know the value of their traditional knowledge as it helps to produce crop and solve food security problems. So the importance of traditional agriculture knowledge cannot be denied as it can be a helpful factor for the development of agriculture and food security. But the policy makers must understand TK as well as the practices of farmers in agriculture to develop the agriculture sector.

Recently the government of Bangladesh has taken steps for environmental management and agricultural extension as to protect traditional knowledge. National Environment Management Action Plan (NEMAP) (1995) recommended that actions on land resources integrate indigenous land use practices and "farmers own indigenous knowledge, which is often environmentally sustainable, and effort be made to support and learn from farmers as well as from the formal research system". It recognized that farmers actively engage in experimentation as part of their daily work.

6.3 The protection of traditional knowledge in Bangladesh:

As to the extent of safeguard for Traditional Knowledge, there is convergence on the need for mechanisms to standardize the application and access as well as on acknowledgement of source and benefit sharing. The disagreement rests on whether the scope should be defined through a measures based or a rights-based approach.

Recently the government of Bangladesh has taken the initiative to protect traditional knowledge by the implementation of the Convention on Biological Diversity (CBD) with the drafting of a legal instrument to conserve biodiversity and community knowledge. The country has been implementing various activities to comply with the provisions under the convention as well as its commitment towards conservation and sustainable use of natural resources.

A draft list of plant genetic resources has already been prepared. It includes the local and scientific names of species, as well as the species' attributes, habitats, status (exotic or indigenous) and uses (Khan and Ahmed 2000). The Bangladesh Academy of Agriculture (1997) documented 100 useful indigenous agricultural technologies that encompass crops, forestry, fisheries and livestock. There are other publications that document hundreds of other technologies related to TK. These technologies and farmers' practices will be further refined, verified and covered under sui generis systems.

6.4 Conservation of genetic resources by agricultural research institutes

Agricultural research institutes (ARIs) are involved in the collection and conservation of genetic material. There are three gene banks with limited facilities in three ARIs: the Bangladesh Agricultural Research Institute, which conserves genetic material for crops other than rice and jute; the Bangladesh Rice Research Institute, which conserves genetic material for rice; and the Bangladesh Jute Research Institute, which conserves genetic materials relating to jute. The lists of genetic resources conserved in those gene banks are documented among the plant genetic resources of Bangladesh. Other ARIs are also involved in in-situ conservation.

6.5 Activities of NGOs in genetic conservation

Among nongovernmental organizations (NGOs), Unnayan Bikalper Nitinirdharoni Gobeshona (UBINIG) which means policy research for development alternatives, the Bangladesh Seed Foundation, and Bangladesh Resource Centre for Indigenous Knowledge (BARCIK) are mainly for genetic conservation and

documentation. UBINIG is involved in community gene banks, with special emphasis on the involvement of women. They conserve mainly traditional varieties of crops and practice organic farming. The Bangladesh Seed Foundation performs similar activities. Participants conserve seeds voluntarily. BARCIK is involved in documentation of TK.

6.6 National committee on plant genetic resources

The government of Bangladesh has organized a National Committee on Plant Genetic Resources to identify national genetic resources and draft related acts to conserve biodiversity and community knowledge and protect new plant varieties. In 1997 the committee organized a national workshop with participation by representatives from related national and international bodies and recorded the status of plant genetic resources in the country. The workshop recommended drafting acts for the protection of biodiversity and community knowledge and new plant varieties. Two draft acts have been prepared and are in the process of approval by the appropriate authority. Following are the salient features of the acts with respect to preserving biodiversity and protecting community knowledge.

6.7 Biodiversity and Community Knowledge Protection Act:

The Convention on Biological Diversity came into force on 29 December, 1993 and became effective in Bangladesh from 12 May, 1994 and it reaffirms and recognizes that States have sovereign rights over their own biological and natural resources. The main objective of the Act is to protect the sovereign rights of communities that have knowledge of biodiversity and have managed, maintained, conserved, reproduced and enhanced biodiversity, genetic resources and TK, culture and various forms of practice related to these resources.

6.7.1 General provisions of the Act

The Biodiversity and Community Knowledge Protection Act covers all biological and genetic resources and related knowledge as well as their derivatives, both in situ and ex situ, within the jurisdiction of the country. It covers all varieties of life forms including plants, animals, fish and aquatic life forms and microorganisms belonging to all species and varieties, wild or cultivated, whether occurring naturally or modified in any manner whatsoever through any process, and their cell lines, genetic material, characteristics and traits, as well as products derived from them and the processes involved therein. The Act also provides legal protection to safeguard these diverse indigenous lifestyles and livelihood practices from degeneration, erosion or destruction.

The Act is designed as an instrument enabling the people of Bangladesh to exercise their sovereign and inalienable rights, formal or informal, over their biological and genetic resources and related intellectual and cultural knowledge. These rights shall be exercised either through traditional and customary laws, practices, values, moral institutions, community arrangements, and institutions or through various laws and regulations of the state, including the new provisions brought into force under the Act.

The Act prohibits violation of common property regimes that include various rights, relations, arrangements and cultural practices, whether or not these have legal expressions or recognition through legal precedents by which communities own, use and have access to biological and genetic resources. It is recognized that the life-supporting and life-affirming systems of the people of Bangladesh are a matter of national security. These systems are traditionally based on biological diversity and ensure availability of food, fiber, medicine, energy, construction materials and other vital necessities. They also provide nutritional and ecological security and conserve the environment, knowledge and culture of the country, which are so important for the survival of its inhabitants. The Act protects, develops and strengthens the integrated, interconnected and unique feature of biodiversity-based agriculture of Bangladesh, which is holistic in spirit and practice and includes fisheries, animal husbandry, poultry raising, forestry and various domesticated and undomesticated plants, animals, birds, fish, microbes and other life forms.

The Act is the legal basis for protecting the biodiversity of genera and species, of all life forms in general, and of particular forms pertaining to plants, animals, insects, microbes, fish, birds or other creatures living in forests, wetlands, marine environments, rivers and other ecosystems. The Act protects and encourages the ingenuity of the various communities in the national interest as well as for the common good of humanity, particularly the innovations of primary food producers such as farming and fishing communities and communities living in forests. The Act recognizes a "community", a "local community" or an "indigenous community" as a legal person with the inalienable rights inscribed in the Act.

The Act prohibits all forms of monopolization of biological and genetic resources and related knowledge and culture. Through it, the state is committed, in case of legal conflicts, to upholding the common property regimes against any private claim to the biological and genetic resources and the intellectual and cultural knowledge and practices related to these resources.

6.8 Plant Varieties Act of Bangladesh

The National Committee on Plant Genetic Resources (NCPGR) has prepared the Act in September 10, 1998. The main objectives of the New Plant Varieties Act are to allow legal protection of commercial plant varieties and provide incentives to private-sector breeders to invest in the development of commercial plant varieties in Bangladesh. The Act allow for legal protection of communities as: owners, users, custodians, and stewards of plant varieties held in common; residual title holders as stipulated in the Biodiversity and Community Knowledge Protection Act; and farming communities with farmers' rights.

The Bangladesh Plant Variety Rights Authority (PVRA) is the proposed executing agency of the Act and has the authority to grant a New Plant Variety Certificate. It is also responsible for arranging regional cooperation for examination of plant varieties and for exchanging information relevant to plant variety rights; determining procedures for farmers' rights; and establishing and managing the Plant Variety Development Fund.

6.9 The National Biodiversity Authority

A National Biodiversity Authority is to be created as a regulatory body at the highest level to ensure proper implementation and enforcement of the provisions of the new Plant Varieties Protection Act. It will function as an independent and autonomous body composed of relevant representatives from the public sector, scientific and professional organizations, women's organizations, development and environmental organizations, and representatives of local and indigenous communities. It will include representatives of related National Agricultural Research System institutes, a Member of Parliament and six members representing different communities. The Authority will also be the implementing agency of the New Plant Varieties Act as well as other acts related to biodiversity and innovation in other areas.

As was mentioned earlier, Bangladesh is developing legal instruments to protect its biodiversity and TK. But still extensive support for implementation of the legal instruments, establishment of the national institute and technical help in the form of expatriate consultants, human resource development and equipment will be needed to protect the country's biodiversity and traditional knowledge.

VII. The Future Of TK In Agriculture

The traditional agriculture knowledge plays an important role as it is related to the food security issues of the developing countries. Following are the major social and economic benefits of traditional agriculture knowledge for the food system:

- It provides a livelihood for millions of people.
- It supports a wide variety of types of farming
- It helps in maintenance and development of in situ biodiversity.
- It supports production in areas that high-tech farming regards as marginal.
- It includes knowledge about how to produce sustainably from low inputs in a wide variety of environments.

There are various researchers, small-farmer organizations and NGOs are calling for a reorientation of both R&D and agricultural policies to support the use of TK. However, they face major challenges given current developments in the food system that take little if any account of TK. The kinds of farming practices and social and environmental relations involved in TK approaches to food are in many senses antithetical to those of the dominant paradigm. As Thomas Cottier notes about what happened to TK in developed countries, "once the IPR systems were fully established, they undeniably contributed to the loss of traditional knowledge in industrial society. New products replaced the need of such knowledge, and, generation after generation, it was increasingly lost and no longer passed on, while at the same time, standards of living were rising for most people".

VIII. Conclusion

In Agriculture, the traditional knowledge is associated with almost all agricultural operations and these are being practiced by farmers in the developing country to ensure food security and livelihood. This research study discussed the importance of traditional agriculture knowledge for food production and different critical issues regarding seed as well as food security. One of important issue is 'patenting seed' which has an affect on the farmers as the price of patented seed will increase and the farmers could never use that seed for agriculture purpose. And this will cause food crisis in the developing countries. As we know that the farmers of the developing countries have started adopting modern agriculture due to the influence of outsiders but they still follow the traditional methods and system. From the study, it is argued that traditional knowledge in agriculture is needed in the developing countries such as Bangladesh because of the food crisis and the negative effect of modern agriculture practices. The government of Bangladesh is trying to protect the traditional knowledge as it is important in the field of agriculture and food security. In recent years, many international forums has taken

steps to protect the traditional knowledge as Convention on Biological Diversity (CBD), the World Intellectual Property Organization (WIPO), the Food and Agriculture Organization (FAO), the World Health Organization (WHO), the UN Educational, Scientific and Cultural Organization (UNESCO) and the UN Commission on Human Rights. To conclude, both the national as well as the international organizations should work together to protect the traditional agriculture knowledge as it is essential for the development of agriculture and food security.

IX. **Some Recommendations**

The role of the traditional agriculture knowledge of indigenous peoples in the development of agriculture is significant and for that protection of TK is necessary. The current allocation of agricultural Research and Development (R&D) expenditures and the kinds of questions that research is trying to address is to improve future prospects for TK-based systems for that action is needed in two areas:

1) National and international agricultural development policies need to take into account TK based approaches in their considerations, from economic measures to the use of publicly funded R&D devoted to participative research with TK-using communities that feel they own and can use this R&D to strengthen their innovative capacity and further develop their farming systems so that food security is ensued.
2) Where appropriate, IPR need to be used to support TK-based agriculture systems so that food security issues can be solved by use of indigenous knowledge.