

Trade and Knowledge Sharing in HYV Rice Seeds

Scope for Cooperation between Bangladesh and India

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Finally, any error that may have remained is solely ours.

(CUTS Centre for International Trade, Economics & Environment)

Abbreviations

BARC:	Bangladesh Agricultural Research Council
BSA:	Bangladesh Seed Association
BSRI:	Bangladesh Sugarcane Research Institute
CAAS:	Chinese Academy of Agricultural Sciences
CAGR:	Compound Annual Growth Rate
CRRI:	Central Rice Research Institute
CUTS:	Consumer Unity & Trust Society
DCGIS:	Directorate General of Commercial Intelligence and Statistics
DRR:	Directorate of Rich Research
ECA:	Eastern and Central Africa
EU:	European Union
FGDs:	Focused Group Discussions
GDP:	Gross Domestic Product
GXAAS:	Guangxi Academy of Agricultural Sciences
HYV:	High Yielding Variety
ICAR:	Indian Council of Agriculture Research
IP:	Intellectual Property
IPRs:	Intellectual Property Rights
IRRI:	International Rice Research Institute
Mn:	Million
MNCs:	Multinational Corporations
MoA:	Memorandum of Agreement
MoU:	Memorandum of Understanding
Mt:	Metric tonnes

NGO:	Non-governmental Organisation
NSA:	National Seed Association of India
OAPI:	African Intellectual Property Organisation
PPP:	Public Private Partnership
PPV&FR:	Protection of Plant Varieties and Farmers' Right Authority
PVP:	Plant Variety Protection
SPS:	Sanitary and Phyto-sanitary
SRR:	Seed Replacement Rate
TRIPs:	Trade-Related Aspects of Intellectual Property Rights
UPOV:	Union for the Protection of New Varieties of Plants

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Foreword

I am happy to learn that Consumer Unity & Trust Society is publishing this Report on “Trade and Knowledge Sharing in HYV Rice Seeds: Scope for Cooperation between Bangladesh and India”.

Rice is an important food crop for India and Bangladesh, countries that may have commonalities in terms of agro-climatic conditions, dietary habits and socio-economic conditions.

Increase in productivity and higher production of rice is mainly dependent on availability of seeds of high-yielding varieties. Many new and promising rice varieties including hybrid rice varieties have been developed in India through National Agriculture Research System.

Similarly, in Bangladesh many promising rice varieties have been released through their research system. It would be better if rice varieties released in one country may be made expeditiously available for cultivation in neighbouring countries having similar agro-climatic conditions so that farmers in the region may get benefits from these varieties.

I hope this publication will play a catalytic role in enhancing collaboration in the seed sector between India and Bangladesh.

Rajesh Kumar Singh, IAS
Joint Secretary
Ministry of Agriculture
Department of Agriculture and Cooperation
Government of India

Preface

Rice being a staple food for the people of Bangladesh and India, timely availability and accessibility of variety rice seeds is critical for food security of the two countries. This is because it is certainly the most critical input for rice production and available at a low cost compared to other inputs such as fertiliser and pesticides. Presence of a large population with low purchasing power that finds it difficult to secure other types of seeds, such as hybrids, makes this input even more important.

In Bangladesh and India, serious problems with regard to making high-yielding variety (HYV) rice seeds available and accessible to farmers are noticed. A significant gap exists between demand and supply of most desired and adaptable varieties. In India, while the overall supply of HYV rice seeds is seemingly sufficient, it is not enough considering specific variety needs of farmers and variations in soil types and farming practices. In Bangladesh, it is noted that the supply of variety rice seeds is only around one-third of its demand.

Mismatch between demand and supply often results in use of regenerated rice seeds for several years, compromising rice yield and productivity. This has also led to emergence of informal rice seeds market and, more importantly, informal flow of rice seeds on both sides of the border between Bangladesh and India. Informal flow across the border can be considered a good indicator of adaptability of rice seed varieties across the border.

While the problem continues, and despite the fact that there exists scope and potential considering similarities in agro-climatic conditions and food habits of people in the two countries, no serious attempt has been made through promotion of trade and cooperation to address the problem. Moreover, despite some impressive achievements in terms of increased rice seeds production at the national level; the two countries have not been able to produce, market and distribute varieties desired and most adaptable to local conditions.

Against this background, trade and cooperation between Bangladesh and India seems to be potent tool. While trade could lead to increased availability and better accessibility of desired variety seeds in the immediate timeframe, cooperation could lead to research and development of new and better varieties, reduce the time period for research and development, and also reduce the time period between seed development and trial on the one hand and their availability on the other. Joint research and collaboration and also knowledge sharing could pave the way to such an enabling environment.

Given this background, this study is prepared under a project titled 'Addressing Barriers to Rice Seeds Trade between India and Bangladesh' (RISTE project), supported by The Bill & Melinda Gates Foundation. I express my gratitude to the Foundation for its generous support.

I hope that this study will contribute and be helpful towards addressing some of outstanding issues that hamper trade and cooperation between Bangladesh and India.

I also hope measures like harmonisation of seed laws and regulations; increased knowledge sharing and addressing IPR-related issues will help in creating an enabling environment for increased trade and cooperation between the two countries.

Bipul Chatterjee
Deputy Executive Director
CUTS International

Executive Summary

Eastern India and Bangladesh share significant similarities in terms of geographical proximity, agro-climatic conditions, diet and socio-economic status. They have also almost similar status with regard to high poverty, undernutrition and low literacy rate. Rice is another peculiarity that defines commonalities between these two countries. It holds a place of prominence in the cropping and eating patterns of the region's native population, making it one of the most valuable commodities that determine the food security of the two countries.

Production of rice is dependent on availability and access to high quality rice seeds, which is the most important agrarian input and is least priced among other inputs. Of all the different varieties of rice seeds, HYV is distinctively better owing to its availability at relatively lower prices and easy accessibility.

Farmers in India, especially in eastern parts (Bihar, Jharkhand, Odisha and West Bengal) and in Bangladesh suffer from lack of adequate availability in HYV rice seeds. This inadequate availability has resulted in informal trade and exchange of varieties seeds with the support of the unorganised sector. Consequently, informal trade has led to penetration of a certain variety of rice seeds in Bangladesh with its origin in India and vice-versa. Over one-fifth of the total area under rice cultivation in Bangladesh is under varieties with their origin in India. Similarly, some varieties like BR-11 from Bangladesh have also gained popularity and farmers' preference in eastern India. All of these have come through informal trade or exchange between farmers in border areas.

The existence of informal trade in rice seeds clearly indicates the implicit demand that can be met more efficiently through formal trade. For this, it is important to understand what specific factors are limiting formal trade in rice seeds between the two countries. There are a range of factors such as unfavourable laws related to access of rice seeds; infrastructure and policy-related issues; lack of knowledge sharing; issues related to IPR violations; and inadequate private sector involvement.

Considering the importance of good quality seeds for yield enhancement and the existence of informal trade in rice seeds between India and Bangladesh, the project 'Addressing Barriers to Rice Seeds Trade between India and Bangladesh' under implementation is well timed and much required. The project focuses on the four states in eastern India mentioned above and aims to create a conducive environment for cooperation and collaboration between India and Bangladesh in rice seeds. This project is supported by the Bill & Melinda Gates Foundation and covers a period of 30 months from January 2013 to June 2015. CUTS has implemented this project with the support of four partners located in eastern India and in Bangladesh.

The two-and-a-half year project has contributed to a constructive dialogue on trade and cooperation between the two countries. Through action research, networking and advocacy, it has involved policy makers, research organisations, NGOs, media and foreign trade specialists from both countries. This has provided excellent opportunities for influencing reforms for formalising trade and cooperation, better knowledge sharing and harmonisation of seed regulations and trade policy between the two countries.

Trade in Seeds between India and Bangladesh

With regard to India's seed trade with Bangladesh, currently there are at least 13 types of seed (primarily fruits, vegetable and rice seed) being traded between India and Bangladesh, mostly comprising exports from India. In 2013, Bangladesh accounted for less than two percent of total seed exports and less than one percent of total seed imports from India. Considering the importance of international trade with immediate neighbours, the data reflects a discouraging scenario. Out of the total seeds exported by India to Bangladesh, cereal seed accounts for about 50 percent. In case of import, Bangladesh share in India's total seed import is less than one percent. This is not surprising considering that India's import of cereal seed is negligible and all of India's seed import is seed of non-cereal crops.

Over the entire life cycle of the project, it has been noted that the trade between India and Bangladesh in inbred rice seed varieties remains conspicuous by its absence.

Evidence found in the course of this study clearly points out that a major factor that constrains trade in HYV rice seeds between the two countries seems to be the nature of the crop. HYV rice seed is a notified crop in both India and Bangladesh which (dis)allows access of variety rice seed from other countries, thereby hindering trade.

The gap between domestic requirement and supply seems to be another potential reason as trade between India and Bangladesh is in crops with relatively higher demand-supply gaps in comparison to rice seed. Furthermore, several infrastructure and policy-related issues also impede trade between both the countries. It includes inadequate seed testing laboratories, delay in issuance of quarantine certificates, lack of infrastructure for trade, lack of mutual acceptance of certified seeds, and lack in harmonised certification processes.

Fear of violation of Intellectual Property Rights (IPRs) is another issue which is adversely impacting trade in inbred rice seeds varieties. Variety seeds can be replicated and farmers can gain from this on a recurrent basis. Another principal disabling factor for trade is inadequate private sector involvement. In both the countries, seed companies confine themselves to trade of seeds, sourcing from public sector and sometimes imports rather than involving themselves in production.

In the course of this study, as mentioned earlier, it was found that informal trade and informal access of HYV rice seeds by farmers in India and Bangladesh have emerged as a phenomenon. Considering the compelling need to curtail informal trade, a protocol between Bangladesh, India and Nepal was signed recently. Considered a landmark agreement as far as cooperation in seed is concerned, it provides for sharing of evaluation data of varieties released in the three countries — which in turn will facilitate commercialisation of varieties released in any of the three countries in others. The agreement applies to all varieties released by the public sector institutions in these countries and IRRI.

Knowledge-sharing in HYV Rice Seeds

Great scope for knowledge creation and sharing exists between India and Bangladesh owing to similarities in agro-climatic conditions and agricultural practices. Over the years, Bangladesh and India have signed several knowledge-sharing agreements with regional and international research and development organisations to promote sustainable agriculture, IRRI being one of them. At bilateral level, Bangladesh has signed agreements with China, India, Iran and a few other countries; India has also signed agreements with Bangladesh and countries in Africa.

With regards to mapping of knowledge sharing, from the agreements signed by Bangladesh and India, it is observed that major focus has been given to improvement in availability and accessibility of seeds, germplasm research and exchange, human resource development, crop and

yield improvement and training of agricultural experts. Another focus, though implicit, is cooperation in the field of rice, the most important staple food.

While talking about cooperation between two countries, distinction needs to be made between knowledge sharing at national level and between countries. Within the confines of a national boundary, knowledge sharing and flow of information takes place among research and development organisations, seed producers, people involved in storage, marketing and distribution, and rice producers. No significant barrier is observed, except that of effective implementation mechanism. More importantly, most of the HYV seeds in India have been developed and released by public institutions and there is no serious issue as far as marketing of these varieties is concerned. In the case of varieties released by private companies, IPR applies at the point of first sale and thereafter variety seed can be used by farmers for any number of years.

Knowledge sharing between Bangladesh and India in inbred rice seeds is not new. In 1983, a formal agreement to promote knowledge sharing and cooperation was signed between the Indian Council of Agriculture Research (ICAR) and the Bangladesh Agricultural Research Council (BARC). However, not much progress has been achieved.

Several factors work as deterrents in promotion of a fruitful knowledge-sharing regime, particularly in the case of inbred rice seeds. Absence of any formal mechanism of cooperation and coordination among stakeholders such as seed producers, traders and seed associations is another major issue hampering knowledge sharing.

A major challenge to knowledge and technology sharing between Bangladesh and India is inadequate understanding of the agricultural situation in both the countries, particularly with regard to availability and accessibility of inbred rice seeds. This coupled with convenience lead to informal trade and exchange of seeds across the border. Inadequate participation of the private sector in inbred rice seed production and distribution is another hurdle.

A new beginning was made in 2014 in the area of knowledge sharing between the two countries, when the Agriculture Secretaries of the governments of Bangladesh and India (and also Nepal) signed a protocol on cooperation in the evaluation data of rice varieties released in their respective countries for release and commercialisation. The agreement facilitates exchange of technologies and quality seed, which will be helpful in achieving higher rice productivity.

Inbred Seeds and Intellectual Property Rights

The regimes of intellectual property rights and plant breeding or biological processes in Bangladesh and India are premised on common frameworks and international conventions. Both have linkages with frameworks like TRIPs and Convention on Biological Diversity, 1992, which serves as a common chord and connects the IPR regimes in the two countries. As part of their obligations, both the countries have created a *sui generis* system to deal with issues related to plant varieties and their protection.

While significant conversance in IPRs regimes in the two countries exists in terms of common heritage (in line with the TRIPs Agreement) and provisions, cooperation in making IPRs a tool for trade and increased access to quality rice seeds remains conspicuous by its absence. Many known and unknown issues could be responsible for constraining trade and cooperation. Penetration of HYV rice seeds across the border and its implications (violation of IPRs) have not been analysed and understood properly.

In both Bangladesh and India, as in many other countries, one-time access or purchase of HYV seeds empowers farmers with unhindered use of the variety for any number of years, as seeds could be used for several years without much degeneration in yield. This makes IPRs very difficult to implement and makes trade an unprofitable proposition. Most of the HYV seeds in

Bangladesh and India have been developed by publicly funded research institutions/government agencies. In addition, IRRI is a major source of such seeds.

In the light of outstanding IPR-related issues that hinder trade, several direct or indirect mechanisms for addressing the IPR-related issues in seeds could be suggested. These could include mandatory certification; harmonisation of laws relating to plant variety protection; material transfer agreements; technology provision, licensing and royalty payment; and other options like making existing HYV seeds developed through public institutions and international organisations like IRRI accessible freely with no IPR attached.

Contribution of the RISTE Project in Creating an Enabling Environment

There seem to be three barriers that constrain trade in HYV rice seeds. These are lack of clear understanding among stakeholders on how HYV rice seeds market functions; lack of knowledge sharing among stakeholders reinforced by apprehensions of market domination by others; and lack of clarity on how IPRs related to HYV rice seeds between the two countries could be resolved.

Several revelations have emerged from the implementation of the project: informal HYV rice seed market and trade is thriving; farmers demand access to quality rice seeds available across the border; and varieties like BR-11, BRRI Dhan-28 and BRRI Dhan-29 (Bangladeshi varieties in India) and Swarna (including Guti and Sada), Parijat, Somsor, Swampa, Mamun (Indian varieties in Bangladesh) are popular in both the countries. These seeds are informally traded through border points at Jiban Nagar, Jessore, Benapole, Kushtia, Pragpur, Khulna, Darshana, Rajshahi, Godagiri, Dinajpur, Lalmonirhat, Burimari, Nawabgunj, Sonamasji and some other points.

There are several important outcomes that resulted from the implementation of the RISTE project. Some major outcomes include:

- Creation of a soft ground through interactions with stakeholders where the project has been able to generate stakeholders' perspectives, which in turn could facilitate further interactions and engagements.
- Government officials on both sides of the border are aware of informal trade and its associated benefits and are now in consensus for trade and cooperation in HYV rice seeds;
- Bangladesh Seed Association and National Seed Association of India are soon likely to sign a memorandum of understanding (MoU) to formalise their relationship;
- Greater awareness and capacity building of media personnel both in India and Bangladesh through five media workshops and several interactions.

Conclusion and Recommendations

In the light of constraints to trade in conjunction with several enabling factors, it seems a reality that bilateral cooperation between India and Bangladesh of HYV rice seeds trade has potential to attain the twin objectives of availability and affordability of quality rice seeds. In order to enhance trade and achieve greater regional cooperation, the following recommendations will further strengthen the recent development:

- To pave the way for trade and cooperation in HYV seeds, predominantly rice seeds, a framework of cooperation must be created. The areas identified for cooperation should be based on concrete facts and national requirements which can be aided by an especially constituted joint subject expert group comprising of scientists from agriculture universities and institutions.
- Trade can be formalised by mutual acceptance of varieties released, which calls for some amendments/changes in policy and practices.

- To counter emerging challenges of low yield and adverse impacts of climate change, there is need for sharing new ideas, technology, and methods, and creating awareness. Institutions like BRRI and BADC in Bangladesh and DDR, CRRI and ICAR in India can collaborate to share knowledge and expertise. An area that is equally important for both the countries is collaboration in stress-tolerant varieties.
- Existing HYV seeds that have been developed through public institutions and international organisations like IRRI should be made accessible freely with no IPR attached. Allowing local production and marketing through licensing can be another useful route.
- There is need for creating awareness and a roadmap towards achievement of the full potential of the recent development achieved through signing of the protocol. Both the countries should start the process of sharing of evaluation data of varieties released in their respective countries for commercialisation.

Given the progress made by the project and the emerging possibility of trade, it is critically important to take forward this message through undertaking activities such as awareness generation, building capacity of seed traders to fully participate in trade, facilitating cooperation and collaboration between seed companies in the two countries.

1

About the Project

Rice is the staple food for a majority of people in South Asia, more particularly Bangladesh and India. Food security in these two countries is, therefore, critically dependent on sustainable rice production, and this, in turn, is intrinsically linked to availability and accessibility to quality rice seeds, the most important and least cost input. The linkages between quality rice seeds and sustainable rice production is well understood, implying that better seed quality positively influences crop yields and production.

Considering the importance of good quality seeds for yield enhancement and the existence of informal trade in rice seeds between India and Bangladesh, the project ‘Addressing Barriers to Rice Seeds Trade between India and Bangladesh’ under implementation is well timed and much required. This project is supported by The Bill & Melinda Gates Foundation and originally covered a period of 21 months from January 2013 to September 2014. It was extended by six months till March 2015. The goal of the project is ‘to develop an enabling environment to promote seeds trade and knowledge-sharing on HYV rice seeds between India and Bangladesh’. It is expected that the goal of the project could be realised by achievement of three major objectives enshrined in the project. These include:

- Understanding factors that drive demand and flow (production, marketing and use) of HYV rice seeds in eastern Indian states and Bangladesh to identify varieties with bilateral trade potential;
- Understanding of systemic enabling factors and challenges (institutions, laws, policies, regulations and practices) to bilateral knowledge sharing and trade of seeds between India and Bangladesh, particularly on HYV rice seeds;
- Influence changes in policies and practices to facilitate formalisation and expansion of bilateral trade and knowledge sharing on HYV rice seeds between Bangladesh and India.

The project focuses on four states in eastern India – Bihar, Jharkhand, Odisha and West Bengal – and aims to create a conducive environment for cooperation and collaboration between India and Bangladesh in rice seeds.

Since its inception in January 2013, the project passed through three phases. The first phase focused on collecting evidence and information relating to HYV rice seeds availability and accessibility in the four Indian states and Bangladesh. The second phase laid emphasis on understanding systemic challenges and enabling factors to bilateral knowledge sharing and trade in seeds between India and Bangladesh, particularly in HYV rice seeds.

Findings from the first and second phase show that farmers in both India and Bangladesh find it hard to access certified/quality rice seeds. This is seemingly because of limitations such as inadequate production, inefficient marketing and distribution system, and lack of private sector participation in the seed supply chain, especially HYV rice seeds. In the border areas between

the two countries, it is observed that farmers in India use varieties with origin in Bangladesh, despite the fact that there is no official arrangement between India and Bangladesh to trade in HYV rice seeds. This is true for Bangladeshi farmers as well.

Availability of Indian varieties in Bangladesh and Bangladeshi varieties in India is made through informal trade channels. Such development often jeopardises farmers' interests and quality of such informally traded HYV seeds is below the acceptable quality level. This often leads to crop damage or reduced yield.

However, the development relating to informal trade is also indicative of the fact that HYV seeds produced in India are adaptable to Bangladeshi climatic conditions and Bangladeshi HYV rice seeds to Indian climatic conditions.

This report follows the two major reports produced earlier: firstly '*Dynamics of Rice Seeds Trade: Need for Cooperation between India and Bangladesh*'¹ and secondly the consolidated report titled '*Rice Seeds: A Study of Availability and Accessibility in Bangladesh and India*'.² The first report reflected major issues and challenges that hamper cooperation between the two countries in rice seeds.

The second report, besides identifying challenges, also revealed opportunities and the way forward for the two countries. The report highlighted that cooperation between the two countries in rice seeds can be fostered and strengthened by measures such as mutual recognition on release of HYV seeds; harmonisation of laws, regulations and policies relating to seeds; joint development and release of varieties, among others.

In the third phase of the project – phase of dissemination and advocacy – several activities have been undertaken including interactions with government officials, seed producers and dealers, research institutions, and seed association at state and national levels. The report '*Trade and Knowledge Sharing in HYV Rice Seeds: Scope for Cooperation between Bangladesh and India*' is an outcome of these activities. It maps out and concretises earlier findings and shows, 'why cooperation in rice seeds between India and Bangladesh is conspicuous by its absence despite the fact that trade in other seeds is a recurring phenomenon'.

Factors responsible for lack of cooperation have been identified. Some of these include: a) rice seeds being a notified crop is itself a barrier for trade; b) lack of political will and commitment in the area of rice seeds; c) lack of mutual recognition of rice seeds varieties released in the two countries; d) issues relating to intellectual property rights; and e) lack of harmonisation in laws, regulations and policies relating to rice seeds. The report then goes on to show how the situation can be improved through bringing in some structural changes and promotion of cooperation and collaboration between the two countries.

The report reveals that potential routes to facilitate cooperation between the two countries are mutual recognition of released varieties by both the countries, harmonisation of laws, regulations and policies, joint development, trial and release of rice seed varieties and addressing issues relating to intellectual property rights. A pre-requisite for this is strong political will and commitment. The two sides also need to view this issue of rice seeds more holistically and make firm commitment on facilitating a regime of cooperation and collaboration in rice seeds. Availability and accessibility of adaptable rice varieties will certainly be helpful in enhancing crop yields and reducing the impact of climate change on food security to people in the two countries.

The report is structured into six chapters. Chapter two analyses trade in seeds between Bangladesh and India. It also outlines seeds' demand and supply scenario in the two countries and factors that influence trade in other seeds. Further, it shows major structural changes required for bringing in an era of cooperation and collaboration in rice seeds between the two countries. These could include: (a) increased knowledge sharing on development and dissemination of new

varieties; (b) resolving issues relating to intellectual property rights, and (c) harmonisation of seed laws, regulations and policies.

Chapter three analyses the importance of knowledge sharing and seeks to find out how such a development could be utilised for optimising rice yield and production gains for the two countries. Chapter four sheds light on intellectual property rights and how these could be addressed through harmonisation of seed laws and regulations. Chapter five sheds light on some outcomes and revelations made by the project with regard to creating an enabling environment for trade and cooperation. Chapter six provides conclusion and recommendations.

With regard to data on seed trade, there is one caveat. The data on seed trade and production is extracted through various relevant sources. This creates scope for some inconsistencies in data as revealed in the report.

2

Trade in Seeds between India and Bangladesh

Introduction: Trade in Seeds

Presently there are at least 13 types of seeds being traded between India and Bangladesh. This is, however, mostly one-way trade – exports from India. Most of the trade is in seeds of fruits, vegetables and rice. Exports from India to Bangladesh include tomato seeds, cabbage seeds, seed of forage plants, cauliflower seeds, fruit seeds, radish seeds, onion seeds, sugar beet seeds, and others seeds. Besides, jute seed is another major item of trade between the two countries.

The volume of India's overall export of seeds, while not huge, is significant. Bangladesh accounted for 10 percent of total export of seeds from India and was ranked the most important destination after Pakistan and the US.

Overall, the total value of fruits and vegetable seeds exported from India in the global market was valued at US\$6.4mn in 2012-13. This is in comparison to exports of US\$3.5mn in 2010-11 and US\$4.9mn in 2011-12.³

In comparison with export of fruits and vegetable seeds, the total value of export of rice seeds from India, though low in value terms, increased impressively during 2010-11 to 2012-13. Export of rice seeds in 2012-13 was valued at US\$1.5mn, and it increased from a level of US\$0.4mn in 2010-11 and much lower (US\$0.08mn) in 2011-12. This is reflective of the fact that while the rice seed export is increasing, the current level is small. In case of fruits and vegetable and jute seeds, interactions with stakeholders (a state-level seed association in India) revealed that trade (export) occurs both in hybrid and certified seeds. At the same time, it is also pointed out that a good quantity of seeds crosses the border through informal channels. This is particularly true for HYV rice seeds.⁴

This section seeks to understand the ground situation, processes and mechanism involved in other seeds trade between India and Bangladesh that are conspicuous by their absence in the case of HYV rice seeds. The focus is to identify and understand existing and potential barriers in HYV rice seeds trade between India and Bangladesh.

The section is structured as follows:

- India's seeds trade vis-à-vis seed trade with Bangladesh;
- Role of trade in meeting seed requirement in Bangladesh;
- Growth in seeds trade in India and Bangladesh;
- Seed trade between India and Bangladesh and the case of inbred rice seeds;
- Factors determining lack of trade in inbred rice seeds;
- Some recent developments.

India's Seeds Market, Trade *vis-à-vis* Seed Trade with Bangladesh

Overall, Indian seed industry both in terms of domestic and foreign market, is doing reasonably well, as indicated by India's rank in the global seed market (see Annexures 2.1 and 2.2). A big contribution has come from globalisation of the Indian seed market, which seems to have facilitated greater presence, cooperation and collaboration between Indian and global seed companies. While the market size has increased from US\$1.5bn in 2010 to about US\$2bn in 2012, export and import seem to have become more diversified. There is significant change as far as trade in seeds is concerned over the last few years.

Overall, India is a net exporter of seeds, implying that the country has been able to reduce the gap between seed requirement and availability (see Annex 2.3). The situation has improved even at the state level (Annex 2.4). It is, however, observed that export from India does not show a consistent trend. India's export in 2013 amounted to over 409,000 tonnes, a decline of 36 percent compared with export of nearly 632,000 tonnes in 2008. A major proportion of India's trade in 2013 was accounted for by cereal seeds, constituting about 53 percent of the total export as shown in Table 2.1. (For data on import/export of vegetable and fruits seeds, see Annex 2.5 and 2.6.)

In comparison, import of seeds more than doubled during the five-year period (2013 over 2008), increasing from a level of about 74,000 tonnes to more than 148,000 tonnes. Interestingly, it is observed that import of cereal seeds is negligible, in contrast import of fruits and vegetable seeds account for almost 100 percent.

Considering India's export and import of seeds, trade relations with Bangladesh in seed do not seem very encouraging. In 2013 Bangladesh accounted for less than two percent of total seed export from India. This is despite the fact that seed export from India to Bangladesh has more than doubled during the period 2008 to 2013.

India's seed export to Bangladesh is confined mainly to cereal seeds (rice, wheat and maize), and fruits and vegetable seeds (for data on seed import by Bangladesh, see Annex 2.7). Out of the total seeds exported by India to Bangladesh, cereal seeds accounts for about 50 percent.

In case of import, Bangladesh share in India's total seed import is less than one percent. This is not surprising considering that India's import of cereal seeds is negligible and all of India's seed import is seeds of non-cereal crops.

<i>India's seed export</i>		
	2008	2013
Export total	631,807	409,049
Export of cereal seeds	266,542	34,660
Share of cereal seeds in total seed export (%)	42.2	9
Export of potato/fruits and vegetable/other seeds	365,265	374,389
Share of potato/fruits and vegetable/other seeds in total seed export (%)	42.6	91
Bangladesh's share in India's total seed export (%)	1	2.8
Share of cereal seeds in India's seed export to Bangladesh (%)	52.8	47.2
Share of Bangladesh in India's total potato/fruits and vegetable/other seeds export (%)	0.7	1.5
<i>Source: Based on ITC Trade Map</i>		

Role of Trade in Meeting Seed Requirement in Bangladesh

Bangladesh is dependent on farmers' saved seeds and seeds from the informal sector for meeting its domestic requirements. Government agencies supply a little more than one-fifth of total seed requirements of Bangladesh. The remaining 80 percent comes through farmers' saved seeds and informal seed sector (Annex 2.8).

In the light of low production capacity and higher requirement, Bangladesh's contribution in international trade in seeds appears to be quite limited in comparison to India for different types of seeds. For example, data for the period 2009 to 2013 show that while export remained in the range of one tonne (2012) to 82 tonnes (2013); import which is much bigger than exports, moved in the range of 1,900 tonnes (2013) to 4,450 tonnes (2010).

In case of maize seed, data reflect a very limited quantity of export, even that for a particular year (2009). In comparison, import is reported to be in the range of 2,800 tonnes (2010) to 7,000 tonnes (2013). Similar is the situation in case of wheat seed – while there is no export, import has remained quite low, and even that only on few occasions.

Bangladesh seems to be better placed in trade in vegetable seeds, such as potato. Both export and import are reported during the period 2009 to 2013. Bangladesh exported 189 tonnes of potato seeds in 2013, compared to 11 tonnes in 2009 and 24 tonnes in 2011. In contrast, the volume of import in 2009 was over 9,400 tonnes, which, however, declined to less than 1,200 tonnes in 2013.

In case of fruit and vegetable seeds (excluding potato), the contribution of trade appears to be more significant. As per the ITC trade data, there are at least three different types of seeds exported by Bangladesh during the period 2009 to 2013. A major proportion of this is in the vegetable segment. In volume terms, the export amounted to 176 tonnes in 2013, increasing from a level of 46 tonnes in 2009.

The vegetable segment also dominates the import segment. Total import of vegetable seeds in 2013 amounted to over 9,900 tonnes, compared to 3,760 tonnes in 2009, recording an increase of more than two-and-a-half times during the four-year period (2009 to 2013).

What is, however, important is that trade in seeds – both export and import – show a fluctuating trend. This essentially implies that local availability of seeds is often inconsistent with increasing level of demand, and therefore the role of trade is quite important.

Unfortunately, country-level trade data for Bangladesh is not available after 2007. This makes it difficult to understand trade relations with regard to seeds between Bangladesh and India. However, data for India makes it clear that India plays a prominent role and continues to remain an important source of seeds for Bangladesh.

Growth in Seeds Trade in India and Bangladesh

The seed situation has improved in both India and Bangladesh in terms of local production and availability of improved quality seeds. This is reinforced by growing level of globalisation of the domestic seed market. Both the countries have embraced and opened up their seed market for global players, and this is reflected by impressive growth rates in seed trade. However, while growth recorded by India is more uniform for both export and import, growth in Bangladesh trade is primarily confined to imports.

At the crop level, the data show that during the six-year period from 2006 to 2012, India's export of rice seeds increased at a compound annual growth rate (CAGR) of more than 50 percent (Table 2.2). However, this is at a low base. The increase was most impressive in case of wheat seeds, which achieved a CAGR of over 140 percent. In comparison, growth in vegetable and fruit seeds was relatively modest. In the case of imports, increase during 2006 to 2012 was

consistent across product categories. Growth rate is recorded in the range of 17-20 percent, except in case of wheat and rice.

In contrast, increase in seeds trade of Bangladesh varies widely across different product categories. While there was an increase of over 200 percent in case of oilseed exports, rice seeds export declined by over 50 percent. This high rate, however, should be interpreted with caution due to a low base. This is true for all seed.

Table 2.2: Growth trend in export and import of Seeds in India		
Types of seed	Export	Import
CAGR (2012 over 2006)		
Rice seed	55.1	0
Wheat seed	142.7	-100
Maize seed	4.4	19.17
Vegetable and fruit seeds	17.4	18.93
Oil seeds	19.1	17.07
Growth trend in export and import of Seeds in Bangladesh		
Types of seeds	Export	Import
CAGR (2012 over 2006)		
Rice seed	-52.10	-40.43
Wheat seed	-	225.69
Maize Seed	-	20.56
Vegetable and fruit seeds	4.34	11.38
Oil seeds	218.47	-31.26
<i>Source: Based on ITC Trade Map</i>		

Seeds Trade between India and Bangladesh and the Case of Inbred Rice Seeds

There are several product categories in which a strong trade relation exists between the two countries. However, in most of the cases, trade remains confined to one-way movement – export from India. In some cases, like potato seeds, import from Bangladesh is recorded for some years. Seeds flow from India to Bangladesh in most of the categories, including rice, wheat, fruits and vegetables. Among these, in case of cereals and rice seeds, trade is mostly confined to hybrid.

Export of fruits and vegetable seeds from India to Bangladesh figures very prominently. There are several categories which are dominated by India in terms of India's share in Bangladesh total import (Table: 2.3).

Type of seeds	2011	2012	2013
Seeds, lucerne (alfalfa), for sowing			
Seeds, clover, for sowing			
Seeds, fescue, for sowing			
Seeds, Kentucky blue grass, for sowing			
Seeds, flower, for sowing	100	100	
Sugar beet seed, for sowing		100	100
Seeds, rye grass, for sowing			100
Seeds of forage plants, except beet seeds, for sowing nes	93	100	77
Seeds, vegetable, nes for sowing	64	83	80
Seeds, fruit and spores for sowing, nes	98	96	100
<i>Source: ITC Trade Map</i>			

When it comes to inbred rice seed varieties, trade between India and Bangladesh remains conspicuous by its absence. This lack of trade is seemingly not because of poor adaptability of Indian varieties in Bangladesh (or vice versa). There are data which show that Bangladesh, during its early years of independence in 1971, was a major importer of variety rice seed from India – Bangladesh imported 701 metric tonnes of HYV rice seeds (470 MT of Jaya and 231 MT of IR-8 varieties from India) in 1971-72. Further, in 1975-76, Bangladesh imported 1,100 MT of IR-20 varieties from India.⁵

Several questions arise in the context of trade in inbred rice varieties, especially in light of the present seed situation. Why there is no trade and cooperation in inbred varieties despite the fact that there is shortage of these seeds in Bangladesh and India; why there is no trade and cooperation despite farmers in both the countries finding it difficult to access right and desired inbred varieties at the right time and affordable prices; why there is no trade and cooperation despite both the countries having a similar agro-climatic conditions and food habits; and many others. To build on the above-mentioned queries, one of CUTS studies⁶ has identified several factors that influence trade in inbred rice seeds between Bangladesh and India.

Factors Determining Lack of Trade in Inbred Rice Seeds

There are several enabling factors that influence trade in other seeds, while at the same time disable trade in inbred rice seeds. A list of disabling factors is shown in Box 2.1. These seemingly work as constraints in the formalisation of trade in HYV rice seeds, although there are zero tariffs for trade in rice seed.

A major factor that constrains trade in HYV rice seeds between the two countries seems to be the nature of the crop. HYV rice seed is a notified crop in both India and Bangladesh. Both the countries have specific provisions that disallow accessing HYV rice seeds from other countries (Box 2.2).

Box 2.1: Factors influencing trade in other seeds

- HYV rice seed, a notified crop
- Both the countries, especially Bangladesh relatively better placed in the production of inbred rice seeds: Local production constitutes (2012):
 - ◆ Rice: over 52%, compared to
 - ◆ Vegetables: 20%
 - ◆ Potato: 9%
 - ◆ Spices: Less than 1%
- Lack of understanding on knowledge sharing and trade
- Lack of harmonisation in seed laws, regulation and policies
- Issues relating to Intellectual Property Rights
- Apprehension of local stakeholders (fear of external dependence)
- Industry's fear of market capturing by other party

Source: Compiled by the author

Box 2.2: How inbred rice seeds can be imported into Bangladesh

- Trade in rice seeds is restricted and in some cases allowed in limited quantity only for trial purpose.
- While seed laws in Bangladesh permit import of 2.5 kg of rice seeds (rice in husk); in India import of 3.0 kg is allowed.
- In both the cases, import is allowed for trial purpose.
- In case, the imported seed is found to be suitable in the local conditions, import of larger quantity is allowed following year(s).
- The process can continue for three years, and thereafter, that particular variety is to be produced locally.

Source: Compiled by the author

The gap between domestic requirement and supply seems to be another potential reason. It is observed that most of the traded seeds between India and Bangladesh are in crops which have relatively higher demand-supply gaps in comparison to rice seed. Data reflect that the domestic supply of HYV rice seeds in Bangladesh, which constitutes over 50 percent of the total requirement, is much better compared to other seeds. It is further supported by the contribution of farmers' saved HYV rice seeds, thereby taking Bangladesh to a relatively comfortable position in comparison to other seeds.

In addition to the information mentioned in the Box 2.1, there are also several infrastructural and policy-related issues that impede trade between both the countries. It includes inadequate seed testing laboratories, delay in issuance of quarantine certificates, lack of infrastructure for trade, lack of mutual acceptance of certified seeds, and lack in harmonised certification processes.

Fear of violation of Intellectual Property Rights (IPRs) is another issue, which is adversely impacting trade in inbred rice seed varieties. HYV seeds can be replicated and farmers can gain from this on a recurrent basis. Unlike hybrid seeds, allowing trade in newly released HYV seeds amounts to transfer of technology and scientific knowhow. Since research and development with regard to HYV rice seeds is primarily controlled by governmental agencies, this calls for negotiation between the two countries to resolve issues related to IPRs. However, this is conspicuous by its absence at the moment because no such effort has been made till date.

Import permit and a phyto-sanitary certificate are required to import rice seeds to Bangladesh as well as India. Furthermore, imported variety of rice seeds need to be included in the list of varieties registered at the national level.

It is reported that exporter/importer in India also requires bio-security, sanitary and phyto-sanitary (SPS) import permits, not only from the Ministry of Agriculture but also from the Ministry of Trade. While importing all food products, India sends the samples of export consignments to testing laboratories located at places far from the customs points, which causes delay in the export process.

Another reason could be lack of proper infrastructure facilities. Poor infrastructure facilities act as a barrier in the delivery of seeds on time in both the countries.

There are also issues relating to quarantine certification procedures in both the countries. For example, India takes 45-60 days in releasing quarantine certificates compared to a week's time taken by Bangladesh. This is because quarantine offices on the India side are located in Kolkata, far from border and trade points (Petrapole border). This induces traders to use sea routes, which again is time-consuming and costly as seed consignments from Bangladesh are routed through either Singapore or Colombo ports. It might be noted that the sea route between Chittagong port of Bangladesh and Kolkata port is presently not operational. The situation is much better on the Bangladesh side – issuance of quarantine certificates takes around 24 hours.

A major disabling factor for trade is inadequate private sector involvement. In both the countries, the private sector suffers from lack of clarity about its role in the overall rice seed production and marketing strategy. As a result, there are differences in the way both sectors perceive and interpret their respective roles. Seed companies confine themselves to trade of seeds, sourcing from public sector and sometimes imports rather than involving themselves in production. Although for some, trade means private sector involvement but this is an area where public private partnership (PPP) could be important.

One aspect of the policy framework is that approval authorities treat all kinds of seeds in a similar manner. All notified crop seed like rice has to undergo two seasons of field testing, whether it is certified by the origin of country or international bodies or not certified at all. This provision makes the registration process quite lengthy.

Informal inbred rice seeds trade between India and Bangladesh

Informal trade and informal access of variety rice seeds by farmers in India and Bangladesh have emerged as a phenomenon. The primary reason for this is increasing domestic demand and issues relating to availability and accessibility, and the convenience factor. Data from IRRI indicates that over one-fifth of the total area under rice cultivation in Bangladesh is under Swarna, an inbred variety released in India. There are several other Indian varieties that have become quite popular in Bangladesh. Similarly, some varieties from Bangladesh have also gained popularity and farmers' preference in India. A list of such Indian and Bangladeshi varieties is presented in Box 2.3.

Box 2.3: Some examples: Popular varieties in India and Bangladesh		
	Indian varieties	Bangladeshi varieties
Bihar	Swarna, Naveen, Konark, Rajendra-Shweta, Rajendra-Bhagwati, MTU-1001	BR-9 (Bangla Rice), BR-12 (Moyna)
Jharkhand	Naveen, Lalat, Swarna, Vandana, IR-64, Rajendra-Mansoori, Sehbhagi, Abhishek, Basmati-307, Sugandha	BR-8 (Asha)
Odisha	MTU-1001, Swarna, Pooja, MTU-1010, Lalat, Khandagiri, Pratikshya	
West Bengal	Swarna, Masuri, Pratikshya, Ranajit, Lalat, Parijat, ananda	BR-11 (BangaBandhu also known as BB-11), Hira (Hybrid)
Bangladesh	Swarna, Parijat, Somsa, Minikit, Rajendra-Shweta, Swarna-Masuri	BR-28, BR-29, Bina-7, BR-39, BRRI-Dhan-50, BR-26, BR-Dhan-34, BR-Dhan-11
<i>Source: Based on interactions with farmers, seed traders and seed associations</i>		

Evidence gathered from the field and revealed during the interactions with stakeholders (seed growers and traders) shows that several rice seed varieties of Indian origin have successfully penetrated Bangladesh agriculture. Similarly, some rice seed varieties from Bangladesh have been successfully adapted in many states in eastern India. All of these have come through informal trade or exchange between farmers at the bordering areas. A sample of cases is shown in Box 2.4.

Box 2.4: Formal/informal Flow of HYV rice seeds between states/countries					
State/country	Bangladesh	Bihar	Jharkhand	Odisha	W. Bengal
Bangladesh		✓	x	X	✓
Bihar	X		✓	X	✓
Jharkhand	X	✓		X	x
Odisha	✓	x	✓		x
W. Bengal	✓	✓	✓	X	
Other states (Andhra Pradesh)	X	✓	✓	✓	✓
<i>Source: Farmers' Focused Group Discussions conducted in India and in Bangladesh (19-28 August, 2013)</i>					

Some Recent Developments

Considering compelling needs and some developments, such as successful proliferation of rice seed varieties across the border, some concerted efforts have been made to foster cooperation in HYV rice seeds between the two countries. One such effort is signing of a protocol between Bangladesh, India and Nepal.⁷ This agreement, considered to be a landmark agreement as far as cooperation in seed is concerned, provides for sharing of evaluation data of varieties released in the three countries, which in turn will facilitate commercialisation of varieties released in any of the three countries in others. The agreement applies to all varieties released by the public sector institutions in these countries and IRRI. Some relevant specific provisions included in this agreement are the following:

- Joint evaluation of varieties for release in similar agro-climatic conditions by respective countries. It also provides for addressing issues relating to IPR, germplasm exchange and others;
- Reciprocal recognition and acceptance of the research and evaluation data generated in one country for varietal release in similar agro-climatic conditions in other countries;
- Reduction of the evaluation time for a variety released in one country by the other countries to speed up the varietal release process;
- Recognition of farmers' participatory varietal selection data generated by the scientists as primary data for varietal release. This is to accelerate release process;
- Simplify the process of evaluation of varieties by use of technology;
- Promote pre-release seed multiplication and demonstration of promising varieties which are in advanced stages of release;
- Development of programs for collaboration in application of biotechnology;
- Recognition of exchange of germplasm;

The agreement is expected to facilitate filling of the existing gap between seed availability and accessibility in the Bangladesh, India and also Nepal.

3

Knowledge-sharing in HYV Rice Seeds

Introduction

Considering that both Bangladesh and India have similar agro-climatic conditions and follow similar agricultural practices – dependent on farmers for a major proportion of total seed supplies – great scope for knowledge creation and sharing⁸ exists. This could be achieved through cooperation among the relevant stakeholders of the two countries.

Further, cooperation need not be confined to the level of research and development of new varieties; it should extend to cover other stakeholders – seed producers, seed associations, seed dealers and seed traders, and last but perhaps the most important governments of the two countries. This is because HYV seed supply chains in both the countries suffer from inefficiencies at multiple levels, including but not limited to marketing and distribution. Potentially, cooperation should cover all stakeholders involved in the seed supply chain. This chapter seeks to map major stakeholders in seeds, particularly rice seeds supply chain and potential areas for cooperation. The background support for this mapping is gathered through existing knowledge sharing and other agreements in agriculture signed by the two countries. The chapter also goes on to highlight major challenges faced by the two countries in ushering in an era of cooperation and knowledge sharing.

India and Bangladesh

Bangladesh

Both India and Bangladesh have forged several knowledge-sharing agreements with regional and international research and development organisations to promote sustainable agriculture leading to sustainable food production.

For example, Bangladesh's partnership with IRRI goes back more than 45 years (for role of IRRI in knowledge sharing and knowledge preservation, see Annex 3.1). It may be noted that IRRI's first outreach programme in Bangladesh was in 1965 – when a set of 303 rice varieties, which constituted the Institute's first international rice testing programme, was evaluated at a government-run dairy enterprise (Savar Farm). This was with support from the Ford Foundation. The following year, the first widely distributed high-yielding semi-dwarf rice variety, IR8, was introduced into the country.⁹

This is not a one-off agreement; several other agreements have been signed by Bangladesh. Some of these include agreements with China, India, Iran and several other countries (Box 3.1). The focus of these agreements is scientific and technical cooperation, considered significant for improving agricultural yield and productivity.

Box 3.1: Some recent agreements in agriculture between Bangladesh and other countries		
Name of the Agreement	Counterpart	Date of sign/entered into force
MoU on Cooperation in the Field of Agriculture between the Ministry of Agriculture of China and the Ministry of Agriculture of Bangladesh	China	April, 2005 <i>For 5 years with a provision of automatic renewal for another 5 years</i>
MoU on Scientific and Technical cooperation in the field of Agriculture between Bangladesh Agricultural Research Council (BARC) and Chinese Academy of Agricultural Sciences (CAAS)	China	September 2008 <i>For 5 years</i>
MoU on Scientific and Technical Cooperation in the Field of Agriculture between Bangladesh and China	China	September 2008 <i>For 5 years</i>
MoU between Bangladesh Sugarcane Research Institute (BSRI) and Guangxi Academy of Agricultural Sciences (GXAAS)	China	February 2009 <i>For Indefinite period</i>
Agreement between Bangladesh and Iran for cooperation in the field of agriculture	Iran	October 1995
Framework Agreement on Cooperation for Development between India and Bangladesh	India	September 2011
<i>Source: Agreements/MoUs between Bangladesh and other countries, http://www.mofa.gov.bd/List.pdf</i>		

Besides what is mentioned above (Box 3.1), Bangladesh has signed several other agreements, all focused on improving agriculture efficiency through knowledge sharing. A list of such agreements is delineated in Annex 3.2.

India

Similarly, India's formal collaboration with IRRI dates back to the mid-1970s, when Indian Council of Agricultural Research (ICAR) and IRRI agreed on research cooperation. In 1974, ICAR and IRRI signed the ICAR-IRRI Memorandum of Agreement (MoA) for cooperation in research and training.¹⁰ Under this umbrella, the two institutions sign new work plans every four years after reviewing research progress and identifying new and future opportunities and areas of research collaboration. Consistent with the priorities of the Indian Rice Programme, recently a forward-looking research and development agenda for four years (2013-16) has been developed and approved. The MoA involves 24 projects (16 ongoing and eight new) with major efforts in upstream research in areas such as crop genetic improvement and future intensive rice systems.

Several other agreements have been signed by India, mostly at bilateral level. All of these agreements seek to facilitate knowledge flow and sharing between the signatories. A brief description of some selected agreements is provided in Annex 3.3.

Mapping Knowledge Sharing and Potential Areas for Cooperation

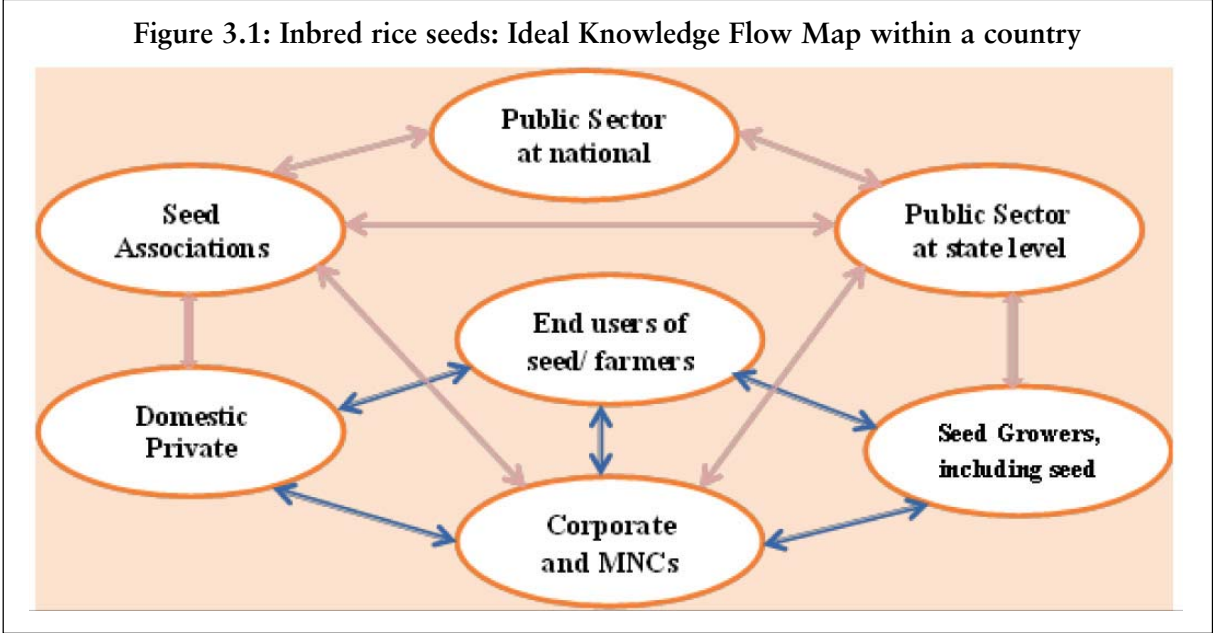
Mapping knowledge sharing

From the agreements signed by Bangladesh and India, it is observed that major focus has been on improvement in availability and accessibility of seeds, germplasm research and exchange, human resource development, crop and yield improvement, training of agricultural experts, all

finally aiming to improve food security in the signatory countries. Another focus, though implicit, is cooperation in the field of rice, the most important staple food.

Interactions with stakeholders in both the countries – research and development institutions, extension officers, seed producers small and big, private and MNCs, wholesalers and retailers, policymakers, last but not the least farmers – makes one believe that they are now in a position to extend their support and cooperation to each other in improving knowledge base. They could also potentially share best available technologies and best practices.

Rice seed supply chain in the two countries¹¹ demonstrates that a number of stakeholders are engaged in different stages. These include, research and development organisations, seed producers, people involved in storage, marketing and distribution, and last but not the least rice producers (Figure 3.1). At each of the stages, there is a knowledge base available internally or externally which is used or has potential to be used to optimise production and/or revenue. For success of any seed technological invention or innovation or good practices, at local or international level, it is critical that stakeholders are made aware of usage of best available technologies. It is worth mentioning that though technology at each stage varies from one stage to another, at the end the chain remains fully integrated and works in tandem.



While talking about cooperation between two countries, a distinction needs to be made between knowledge sharing at national level and between countries. Within the confines of a national boundary, knowledge sharing and flow of information takes place among these stakeholders. No significant barrier, except that of effective implementation mechanism, is observed. More importantly, most of the HYV seeds in India have been developed and released by public institutions and there is no serious issue as far as marketing of these varieties are concerned. In the case of varieties released by private companies, IPR applies at the point of first sale and thereafter HYV seed can be used by farmers for any number of years.

When it comes to knowledge sharing in inbred rice seeds between two countries, as in the present context India and Bangladesh, the map undergoes complete alteration as stakeholders change. Governments of the two countries become major stakeholders, with other important ones being research and development organisations involved in seeds, seed producers and associations, and of course farmers.

It needs mentioning that knowledge sharing between relevant stakeholders will require arrangements between the originator of knowledge and the beneficiary. Several issues will arise, but these could be addressed under existing national and international arrangements, as in the case of several other countries.¹²

Many of the potential areas for knowledge sharing (such as research and development, production and marketing) are inter-connected; implying any attempt to address one might have implications on others. In the box below, (Box 3.2), an attempt has been made to map major stakeholders and their potential areas of cooperation.

Major stakeholders and their potential role are delineated below.

Box 3.2: Mapping Knowledge Sharing in HYV Rice Seeds and Potential Areas for Cooperation	
Type of institutions	Potential areas for knowledge sharing and cooperation
Governments of Bangladesh and India	<ul style="list-style-type: none"> • Fostering broad understanding on knowledge sharing and cooperation • Creating enabling environment for knowledge sharing and cooperation between other stakeholders • Initiatives towards harmonisation of seed laws and regulations
Research Institutions in Bangladesh (such as BADC, BRRI) and India (such as ICAR and CRRI)	<ul style="list-style-type: none"> • Sharing of data and information on new developments and research (germplasm) • Identifying specific areas for knowledge sharing and cooperation • Joint research and development and trial • Sharing of best practices
IPR regimes in Bangladesh (such as National Biodiversity Authority) and India (such as National Biodiversity Authority)	<ul style="list-style-type: none"> • Identifying and taking necessary steps for making IPR rules conducive for cross border flow of seeds
Seed testing, certifications and quarantine agencies in Bangladesh and India	<ul style="list-style-type: none"> • Sharing knowledge and information on testing and certification requirements • Facilitating mutual recognition
Seed producers' associations in Bangladesh and India	<ul style="list-style-type: none"> • Sharing knowledge on market functioning and mechanisms • Forging an MoU to take advantage of recently signed protocol • Facilitate cross border movement of seeds
Seed producers in Bangladesh and India	<ul style="list-style-type: none"> • Sharing seed technologies available at the producer level • Entering into collaboration/licensing for production and marketing of seeds
CSO/NGOs in Bangladesh and India	<ul style="list-style-type: none"> • Creating an environment for greater cooperation and knowledge sharing • Facilitating cross border cooperation • Creating awareness on new developments among relevant stakeholders
<i>Source: Authors' compilation</i>	

Some Examples of Knowledge Sharing in Inbred Rice Seeds Between Bangladesh and India

Knowledge sharing between Bangladesh and India in inbred rice seeds is not new. Examples exist to reinforce this argument. During initial years of its independence, Bangladesh imported HYV rice seeds from India at two instances during the early years of its independence (see Chapter 1). It might be noted that the 1970s and early 1980s were the periods when Bangladesh faced alarming deficits in meeting its seed requirements. There has been an impressive improvement in the situation over the last few decades. Bangladesh is now better placed to meet its domestic seed requirements.

However, unavailability and inaccessibility of quality seeds continues to remain a major concern. Impressive development in the seed sector has not reduced the scope and potential for knowledge sharing between the two countries. In 1983, a formal agreement to promote knowledge sharing and cooperation was signed between the Indian Council of Agriculture Research (ICAR) and the Bangladesh Agricultural Research Council (BARC). Under the agreement, both the parties agreed to promote and accelerate the progress of research and training in scientific cultivation of various crops through the agricultural research institutes.

Some of the major provisions in the agreement include:

1. Cross-hosting or exchange of visiting scientists, trainees, graduate scholars and other professionals between ICAR and BARC;
2. Exchange of germplasm and other materials for the breeding, testing and propagation of improved lines and varieties of crops;
3. Free interchange of scientific information that is of value to research and training;
4. Joint sponsorship of, or participation in, research, training seminar/ workshop and technology transfer projects.

Not much progress has been achieved over the last three-decade period, as reflected by lack of cooperation and trade in HYV seeds. Several reasons are cited for this, including that HYV rice seed is a notified crop and there is no mutual recognition of varieties released in India and Bangladesh. Apprehensions such as fear of external dependence and market capturing by other countries and also intellectual property rights are other issues.

Because of such barriers and apprehensions, no serious effort was made in the recent past either by governments or by other stakeholders towards the promotion of trade and knowledge sharing in HYV rice seeds through harmonisation of seed laws and regulations. Even initiatives such as the SAARC Seed Bank are yet to have any impact on this subject.

Developments in recent years, however, can be remotely linked to the agreement in 1983. Assam Agricultural University of India in 2014 made a request to the BRRI for seeds of BRRI Dhan-29. In addition, evidence suggests that BADC recently exported seeds of hybrid rice SL-8 to India for experimental cultivation. The issue is, such cooperation is not on a regular basis: rather, it arises when there are deficits in some sowing seasons.

Recently, the era of knowledge sharing between the two countries marked a new beginning, when the Secretaries of Agriculture of the Governments of Bangladesh and India (and also Nepal) signed a protocol on cooperation in the evaluation data of rice varieties released in their respective countries for release and commercialisation.¹³ The agreement facilitates exchange of technologies and quality seed which will be helpful in attaining higher rice productivity in the region.

Signing of this agreement is expected to usher in a new era of collaboration and cooperation and will help in improving the livelihood of the poor farmers in the entire region. This cooperation will also provide a platform to share the good practices of one country with others. Further, it is hoped that the agreement will be extended to other crops.

Challenges to Knowledge Sharing and Lessons from India-Africa Cooperation

Challenges to Knowledge Sharing

Several factors work as deterrents in promotion of a fruitful knowledge-sharing regime, particularly in the case of inbred rice seeds.

Absence of any formal mechanism of cooperation and coordination among stakeholders such as seed producers and traders, seed associations is another major issue hampering knowledge sharing.

A major challenge to knowledge and technology sharing between Bangladesh and India is inadequate understanding of agricultural situations in the both the country, particularly with regard to availability and accessibility of inbred rice seeds. This, coupled with convenience, leads to informal trade and exchange of seeds across border.

Inadequate participation of the private sector in inbred rice seed production and distribution is another hurdle. The inbred rice seed market is mostly controlled by public sector organisations, and the role of the private sector is very limited. The private sector, through greater involvement in seed production and distribution, could potentially play a significant role in fostering an era of knowledge sharing and cooperation.

In the light of lack of formal arrangement towards knowledge sharing, informal trade has emerged as a phenomenon. Farmers in both the countries, particularly in the border areas, have become fond of varieties with origin in other country. Some of the Indian varieties are used in a huge area under rice cultivation in Bangladesh. Similarly, some Bangladesh varieties are become very popular in eastern parts of India, including Bihar, Jharkhand, and West Bengal.

Lessons from India-Africa Cooperation

With regard to knowledge sharing, a lesson can be drawn from existing partnership agreements between India and African countries in the area of agriculture technology and innovation. The agreement seeks to adopt a number of measures, including a virtual bio-tech platform to agribusiness centres and seed investments.

The agreement focuses on capacity building, development, and knowledge transfer and adoption in common priority research areas. It provides for fellowships for African researchers to work in Indian science and agriculture institutes; training African researchers in areas such as biomedical sciences, technological innovation, energy, environment and sustainable development; strengthening research institutes in Benin, Gabon and Tunisia; and the transfer and adoption of small and medium scale technologies.

Besides, both the parties have also agreed on setting up laboratory standards for seeds and other sources of genetic materials such as plant tissues; establishing seed incubator facilities for private-sector entrepreneurs in Africa; and building Africa's capacity for seed research.¹⁴

4

Inbred Seeds and Intellectual Property Rights

Intellectual Property Rights and Living Organism

Intellectual property (IP) refers to creations, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce. Such creations worldwide are protected by law through various means, such as patents, copyright and trademarks. The basic purpose is to enable inventors or creators to earn recognition or financial benefit from what they invent or create. Some limitations are always there as the IP regime also seeks to strike a balance between the interests of innovators and the wider public interest. In sum, the IP system aims to foster an environment in which creativity and innovation can flourish.¹⁵

As implicit in the IP definition, Intellectual Property Rights (IPRs) are the rights given to persons over the creations of their minds. IPRs usually give the creator an exclusive right over the use of his/her creation for a certain period of time.¹⁶ However, it is also noted that in practice, such exclusive rights are usually subject to some limitations and exceptions.

In case of living organism or, say, plant breeding, IPRs refers to the rights given to the inventor or breeder of a variety over use of his/her creation. Such rights, distinct from patents (see Annex 4.1), are usually based on some globally accepted criteria, namely distinctiveness, uniformity, stability and novelty. These fall within the purview of plant variety protection (distinct from patents, which are meant for industrial products).

For most of the developing countries, including Bangladesh and India which are the focus of this study, IPRs in living organism or, say, plant breeding is relatively a new phenomenon as compared to industrialised countries, and also in comparison to manufactured products. In fact, living organisms globally were considered outside the realm of IPRs, as these are linked to natural processes. And therefore, any development with regard to living organism was considered as 'discovery' and not an invention, and thus was not subject to IPRs. The global community, especially farmers, for long immensely benefitted from such a regime free of IPRs.¹⁷

The scenario got completely altered in the 1990s. By the mid-1990s, some industrialised countries – members of the Union for the Protection of New Varieties of Plants (UPOV)¹⁸ – began to offer limited forms of plant variety protection (PVP), considered as an alternative to patents, to breeders of new crop varieties. The process was further necessitated by the signing of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) in 1995, an international agreement under the auspices of the World Trade Organization.¹⁹ Gradually and increasingly, a number of developing countries, including Bangladesh and India, became part of this international arrangement and brought plant breeding under the ambit of the PVP through the *sui generis*

approach (see Annex 4.2 for evolution of IPRs in plant breeding; and Annex 4.3 for IPRs linkages with plant breeding in Bangladesh and India).

The purpose of this chapter is to assess conversance or lack of conversance in IPRs regimes relating to inbred rice seeds which facilitate or constrain cooperation between India and Bangladesh. It also seeks to shed light on similarities and inconsistencies between the two and how these influence cooperation in inbred rice seeds varieties. Further, it goes on to suggest measures to improve the cooperation between the two countries. However, there are caveats. While the focus of this paper is inbred rice seed, the analysis is not confined to rice seeds per se, rather it extends to cover IPRs in inbred varieties of all crops. This is because at the country or global level, there is no separate framework for inbred rice seeds – issues relating to all inbred and other types of seeds are addressed by a common law and framework.

Moreover, global experiences relating to IPRs in seeds show that while it is relatively easy to control and monitor IPRs in hybrid and genetically modified crops, the issue seems highly complicated in the case of HYV seeds. In fact, in such cases, there is very low incentive to apply for plant variety protection.

Convergence of IPRs in Variety Seeds in Bangladesh and India

The regimes of intellectual property rights and plant breeding or biological processes in Bangladesh and India are premised on common frameworks and international conventions. Both have linkages with frameworks like TRIPs and Convention on Biological Diversity, 1992, which serves as a common chord and connects the IPR regimes in the two countries. As part of their obligations, both the countries have created a *sui generis* system to deal with issues related to plant varieties and their protection.

Further, IPR regimes in both Bangladesh and India converge towards achievement of several common goals, which include protecting the interests of plant breeders, which are expected to boost further research and investment in the seed sector; protecting the interests of farmers by allowing farmers to use, exchange and sell saved seeds. Overall, IPR regimes in both countries seek to facilitate emergence of a vibrant seed industry.

Technically, in the case of India, the PPV&FR Act 2001 provides ample scope for such cooperation. The Act does not discriminate in plant variety registration by Indian and foreign nationals and it makes the procedure for obtaining plant variety registration uniform for Indian as well as foreign nationals. The only requirement from a foreign national is furnishing proof of address in India while applying for the plant variety registration.²⁰

Going a step further, the PPV&FR Act 2001 sets up guidelines for the protection of varieties so registered (even by foreign nationals). It specifies two conditions that constitute infringements:

1. *If a person who is not a breeder of a variety registered under this Act, or a registered agent or a registered licensee of that variety, sells, exports, imports or produces such variety without the permission of its breeder or within the scope of a registered license or registered agency without their permission of the registered license or registered agent.*
2. *If a person uses, sells, exports, imports or produces any other variety giving such variety, the denomination identical with or deceptively similar to the denomination of a variety already registered under this Act, in such a way that it causes confusion in the mind of general people in identifying the registered variety.*

Such infringements are punishable with imprisonment for a term not less than six months which can be extended up to three years or with a fine not less than ₹1 lakh which may be extended to ₹5 lakh, or with both.

The IPR rules in the two countries show several commonalities (Table 4.1) and convergence. In the light of these commonalities and existing challenges to seed availability²¹ in the two countries, and also the similarity in agro-climatic conditions, it is natural to suggest that both countries should come forward and address outstanding issues, including IPRs, and provide for creation of better cooperative regimes.

Table 4.1: Comparison of PVP laws in India and Bangladesh		
Particulars	India	Bangladesh
Length of protection	<ul style="list-style-type: none"> • 18 years for trees and vines, • 15 years for other crops and extant varieties 	<ul style="list-style-type: none"> • 7 years for annuals • 10 years for Bi-annuals • 15 years for perennials • 25 years for woody plants, utilising timber
Coverage	<ul style="list-style-type: none"> • 18 crops currently eligible 	
Farmers saved saving and exchange	<ul style="list-style-type: none"> • Seed saving, exchange, and sale by farmers are broadly permitted. • Farmers are only prohibited from selling “branded seed.” 	
Breeder’s exemption	<ul style="list-style-type: none"> • Protected varieties may be used for breeding 	
Farmers Right	<ul style="list-style-type: none"> • right to seed, • right to register varieties, • right to reward and recognition, • right to benefit sharing, • right to intonation and compensation in case of crop failure, • right to compensation for undisclosed use of traditional varieties, • right to adequate availability of registered material, • right to free services and protection from legal infringement in case of lack of awareness 	<ul style="list-style-type: none"> • right of farmers and communities to protect traditional knowledge relevant to plant genetic resources for food and agriculture. • right to equitably participate in the sharing of benefits from the utilisation of plant genetic resources • right to participate in making decisions on matters related to the conservation and sustainable use of plant genetic resources • right to seek cancellation and or retribution, as the case may be, for appropriation by formal sector breeders of denominations traditionally in use for their varieties. • right to grow, save, use, exchange, and sell farm-saved seed of any variety except selling of seed of a protected variety for the purpose of reproduction under commercial marketing arrangements. • right to access to all information relevant to the exercise of their rights with respect to plant varieties
<p>Source: 1. India: <i>The Protection of Plant Varieties and Farmers’ Right Act, 2001</i> http://agricoop.nic.in/PPV&FR%20Act,%202001.pdf 2. Bangladesh: <i>Plant Varieties Act of Bangladesh, 1998</i> http://www.farmersrights.org/pdf/asia/Bangladesh/Bangladesh-pvpdraft98.pdf</p>		

IPRs-related Issues that Constrains Cooperation between Bangladesh and India

While significant conversance in IPRs regimes in the two countries exists in terms of common heritage (in line with the TRIPS Agreement) and provisions, cooperation in making IPRs a tool for trade and increased access to quality rice seeds remains conspicuous by its absence. Many issues could be factors constraining trade and cooperation. Some of these are delineated below.

Narrow Approach

It seems neither of the two countries has viewed the issue of variety rice seeds availability and accessibility in a holistic manner. Major considerations towards addressing the issue have remained confined within national boundaries: each country being confident that they have necessary wherewithal to meet local variety seed requirements on their own. Penetration of variety rice seeds across the border and its implications (violation of IPRs) have not been analysed and understood properly.

Lack of Country-Level Mechanism to Handle Trade-Related IPRs in Variety Rice Seeds

In both Bangladesh and India, as in many other countries, one-time access or purchase of a variety seed empowers farmers with unhindered use of the variety for any number of years, as seeds could be used for several years without much degeneration in yield. This makes IPRs very difficult to implement and makes trade an unprofitable proposition. This is in sharp contrast to IPRs in hybrid and genetically modified crops, where it is much easier to implement and monitor.

Variety Rice Seeds Developed by Public Institutions

Most of the variety seeds in Bangladesh and India have been developed by publicly funded research institutions/government agencies. In addition, IRRI is a major source of such seeds. It seems quite difficult for these organisations to execute and monitor IPRs when varieties cross national boundaries. Limited private sector involvement in variety seeds trade further limits opportunity for trade and cooperation.

Addressing IPR Issues in Variety Seeds

In the light of outstanding IPR related issues that hinder trade, several direct or indirect mechanisms for addressing IPR-related issues in seeds could be suggested. These could include mandatory certification; harmonisation of laws relating to plant variety protection; material transfer agreements; technology provision, licensing and royalty payment; and other options (also see Box 4.1). All of them call for government-to-government negotiation and coming out with a roadmap to resolve outstanding issues and to pave the way for trade and cooperation between the two countries. These are briefly described below.

(a) Mandatory certification

There could be a provision in the seed laws for mandatory registration of variety seeds. Such provisions will allow breeders to control access to their varieties, and give them freedom to decide which company can produce a registered variety. This way, breeders particularly from the private sector in Bangladesh and vice versa can register their varieties in the other country and ensure that there is no infringement of their IPRs relating to a particular variety. Examples exist in other countries: in Uganda, small seed companies might access several varieties which could be sold in the domestic market and exported to other countries under an arrangement with the breeder.

Box 4.1: Examples – how some countries are addressing IPRs in inbred seeds

- Many EU countries now attempt to enforce restrictions on seed saving for field crops; its implementation in terms of royalty collection is uneven.
- In EU, small farms (defined in terms of land required for specific production levels) are allowed to save seed of protected varieties, while larger farms that save seed of these varieties must pay a royalty (defined by the EC as 50 percent of the retail price).
- Experiences of different countries vary with regard to collection of royalties. For example, while royalty collection is fairly efficient in the UK and the Netherlands; it is less efficient in France (where many farmers refuse to cooperate with the scheme).
- The US government permits seed saving of PVP protected varieties, but the expanding use of plant variety patents and grower agreements means that farmers are restricted from saving seed of many commercial varieties.
- The Netherlands in the 1980s, while allowed seed saving for field crops, prohibited saving of planting material for flower crops.
- Colombia is the one of the few developing countries having a ruling to limit seed saving. It prohibits seed saving of protected varieties by farmers owning more than five hectare of land. The impact of this ruling is, however, yet to be known.

Source: Robert Tripp, Niels Louwaars, Derek Eaton (2006), *Plant variety protection in developing countries: A report from the field (emphasis added)*

(b) Harmonisation of laws relating to plant variety protection

Both the countries could make their plant variety protection regime consistent with each other, keeping an eye on beyond the boundary cooperation and creating space for breeders from each other. International experiences show several such developments. Seventeen countries in West and Central Africa under the African Intellectual Property Organisation (OAPI) have implemented a single PVP covering all member countries. The system represents a harmonised regional approach to PVP. In this system, one application by a breeder covers all member countries.²²

Besides, harmonisation of regulatory and legal frameworks relating to seeds could be another option to address IPR-related issues between Bangladesh and India. An initiative in Eastern and Central Africa (ECA) in 2002 covering Kenya, Tanzania and Uganda and later in 2004 extended to cover Burundi, DR Congo, Eritrea, Ethiopia, Rwanda, Madagascar and Sudan shows its beneficial effects on addressing seeds and IPR related issues in these countries.²³

Such a system could be explored and if suitable could be replicated in Bangladesh and India.

(c) Material transfer agreements

The Seed Bank Agreement signed by the SAARC member countries in 2011 provides scope and opportunity for sharing and transfer of germplasm. A Framework for Material Transfer Agreement has also been signed between the member countries. The purpose is operationalisation of the SAARC Seed Bank Agreement, mainly for facilitating easy movement of seed and planting materials across South Asia. Even at the bilateral level, there is an arrangement between Bangladesh and India towards sharing materials and germplasm. The agreement provides safeguard to misuse of materials.

This arrangement could be operationalised to resolve IPR-related issues between the two countries (for India's experience in trade in germplasm, see Box 4.2).

Box 4.2: Trade in germplasm by India

India continues to remain an important destination for trade in germplasm. The import of germplasm accessions in India increased from a mere 7,816 in 1995 to 37,018 in 2012. It is noticed that while in the pre-PVP era, the highest number of imports numbering 24,052 was registered in 1999; there was stagnation in the 2003-07 period. Thereafter, an increasing trend is observed. Export of germplasm from India, on the other hand, was quite limited. India exported a very small quantity of germplasm and showed a declining trend over years, barring 2000 and 2002. Besides the PVP&FR Act, Biodiversity Act as well seems to have played an important role in trade in germplasm.

Source: P. Venkatesh and Suresh Pal, Impact of Plant Variety Protection on Indian Seed Industry, Agricultural Economics Research Review, Vol. 27 (No.1) January-June 2014 (emphasis added)

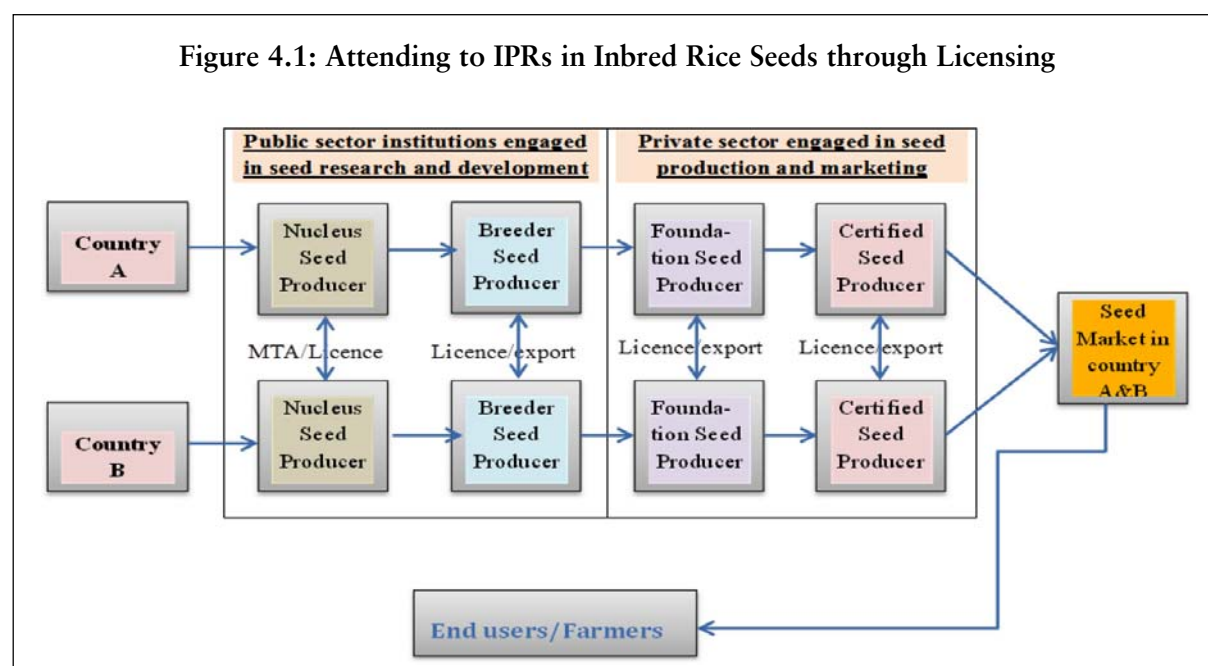
(d) Licensing, royalty payment and technology provision

Licensing of suitable Bangladeshi varieties in India and vice versa is an option to address IPR-related issues in HYV seeds between the two countries. Seed producers in the two countries could enter into some arrangement where government/breeder in one country licenses producer in the other for undertaking production of a particular registered variety.

Such an arrangement could occur through cooperation between governments, in which case one government shares technology and allows production and marketing in another. This holds true for varieties developed using public money. A government could also share technology with the private sector (Figure 4.1).

In case a variety is developed and owned by private companies, the right to produce and market a particular variety could be transferred to companies in the other country with provision of royalty payment for production and use of a registered variety. It is, though, a known fact that in the South Asian perspective, royalty payment for use of protected varieties seems quite unusual and complicated. There are, however, examples at global level and also in India which provide

Figure 4.1: Attending to IPRs in Inbred Rice Seeds through Licensing



the region the option to resolve IPR-related issue in variety seeds. For example, in the European Union large-scale farmers are made to pay a royalty (usually 50 percent of normal rate) to the breeder for re-use of a protected variety. Small-scale farmers, however, are exempt. Going further, United States does not allow exchange of seeds between farmers, though farmers are entitled to re-use seeds for own use.

Further, in India, Monsanto, a major global player, has recently shifted its focus from seed production to technology provision. This way, it generates income from licensing arrangements and leaves the task of enforcement to local partners.

Such initiatives at the country level could help the public sector in both Bangladesh and India to cooperate and collaborate between themselves and also with the private sector in the two countries.

Other options

As indicated earlier, a landmark development has taken place recently. The governments of Bangladesh and India (also Nepal) have signed an agreement towards sharing of evaluation data of varieties released in their respective countries for release and commercialisation in other countries. This applies to rice seed varieties developed by public sector organisations in all the signatory countries and also that of International Rice Research Institute (IRRI). It is expected that this initiative will create a mechanism to address many of the issues relating to intellectual properties in inbred rice seeds. What is equally important to note is that this agreement will facilitate exchange and trade in inbred rice seed varieties.

There is, however, a need for creating a roadmap embedded with a set of tools to address issues related to IPRs in varieties developed by both public and private sector organisations. Governments of the two countries should agree and come forward to create an enabling environment. To start with, two specific initiatives towards addressing IPR-related issues could include:

- Existing HYV seeds that have been developed through public institutions and international organisations like IRRI should be made accessible freely with no IPR attached. For example, varieties like Swarna, Parijat, etc. can be freed and allowed to be traded without restriction. Similarly, BR 11, BR 28 and 28 could be freed for trade;
- Initiatives such as joint development of modern varieties suitable to local conditions with governments of the two countries bearing the cost could also be agreed.

5

Contributions of the RISTE Project

Barriers to Trade and Cooperation

There seems to be three potential barriers (as reflected in chapter 2-4), that hinder trade and cooperation in HYV rice seeds between Bangladesh and India. These are: (1) lack of clear understanding among stakeholders on how HYV rice seed market functions and the support local seed supply chain garner through informal access of seed from across the border; (2) lack of knowledge sharing among stakeholders reinforced by apprehensions of market domination by others; and (3) lack of clarity on how IPRs related to HYV rice seeds between the two countries could be resolved.

Significant obscurity prevailed on each of the potential barriers when the project ‘Addressing the Barriers to Rice Seeds Trade between India and Bangladesh’ (RISTE) was launched in January 2013. Besides what is indicated above, there was also lack of understanding on ‘even though there is no tariff and related barriers to trade between the two countries, why trade in HYV rice is conspicuous by its absence.’ Other questions, such as what prevents the private sector to advocate for trade and specific varieties available in Bangladesh and India that are highly suitable and adaptable to the other, were also observed.

In the 27-month period till March 2015, many of the above questions have been answered. There is a better understanding of both enabling and disabling factors that could potentially hinder or facilitate trade and cooperation, as revealed by various briefing and research reports produced under the project.²⁴ The project has successfully identified major stakeholders who could influence trade and cooperation. Furthermore, during the project period, a number of tangible and intangible developments have taken place, which seems to be creating ways and means for greater cooperation and also trade. Many of them could be directly or indirectly attributed to activities under the RISTE project (Box 5.1).

A summary of achievements with respect to project goal and objectives is shown in Annex 5.1.

This chapter presents some major contributions and revelations made by this project towards resolving the three major barriers to trade and cooperation between Bangladesh and India. It also provides some details on the activities under the project that have contributed in building consensus among stakeholders towards the issue of creation of an enabling environment for trade and cooperation.

Major Revelations from the Project

Several revelations emerge from the implementation of the project. Among these, five major revelations which are in fact lessons and call for stakeholders, particularly government, attention. These are informal trade in HYV rice seeds is thriving; farmers demand access to quality rice seeds available across the border; identification of rice seed varieties informally traded;

Box 5.1: Major activities under the RISTE project (Bangladesh and India)

- Literature review;
- 15 farmers' FGDs covering over 500 farmers;
- Interactions with seed producers;
- Interactions with seed wholesalers and retailers;
- Interactions with seed associations;
- Interactions with research institutions;
- Interactions with government officials, including certification and quarantine agencies
- Production and dissemination of reports, research papers and articles;
- Five state and national level consultations;
- International conference at Dhaka;
- Five media briefing workshops;
- Initiatives to facilitate cooperation between relevant and similar institutions in both the countries (seed associations)

Source: www.cuts-citee.org/RISTE

identification of points of informal trade in HYV rice seeds and stakeholders in both Bangladesh and India seem to be at consensus for formalisation of trade and greater cooperation between the two countries.

Informal HYV Rice Seed Market and Trade is Thriving

When farmers find it difficult to access good quality rice seeds at the right time and affordable prices, they tend to explore other possibilities. Inadequate rice seed production and inefficient marketing and distribution in Bangladesh and India are inducing farmers to use seeds brought in through informal routes.

The magnitude of the informal use of rice seed varieties can be understood from the fact that in Chapai Nawabganj district of Bangladesh out of 48,000 hectare land, Swarna is cultivated in 33,000 hectare in Aman season. Seeds are made available through both informal trade and exchange between farmers. Farmers meet most of their seed demand from their preserved seed. Miniket and Swarna seeds are coming informally to Bangladesh at Benapole area of Jessore district in 30-kg packages. These are certified seeds from the Indian authority, which is sold in the informal market at Tk 60 per kg.

Indian varieties are dominant in the region in many bordering areas of Bangladesh. After getting expected amount of production, they preserve it for their next cultivation time. In the Jessore border area, it is found that foundation seeds and certified rice seeds are smuggled from India and used for cultivation.

Similarly, many Bangladeshi varieties are quite popular, as indicated above. Interactions with seed dealers in West Dinajpur district of West Bengal revealed that about 20 percent of the total seeds sold are Bangladesh variety (BR11). In one particular district of West Bengal, it is noted that a single seed producer produces about 600-700 metric tonnes BB11 (originally BR11) seeds and supplies these to other eastern and north-eastern states. Such varieties are performing quite well in local conditions of eastern region of India.

Farmers Demand Access to Quality Rice Seeds Available Across the Border

Farmers are the most important stakeholder in the rice seeds supply chain. It is, therefore, of critical importance that their views and perspective with regard to availability and accessibility is properly understood by other stakeholders. Interactions with farmers reveal that several rice seeds varieties available across the border are suitable and adaptable to local conditions. Farmers, with whom the project interacted, especially in the bordering areas, show high preference for quality seeds available across the border. This preference is premised on their experience from use and adaptability of several rice seed varieties that have crossed the border through illegal means.

It might be noted that to gather farmers' perspective, altogether, 15 farmers' FGDs were organised (three in each of the selected four states in eastern India and three in Bangladesh). FGDs in West Bengal and Bangladesh were mainly confined to border areas, where there were indications of informal trade (see Box 5.2).

Box 5.2: Areas covered under the project	
State/country	Areas selected
Bangladesh	Jessore, Dinajpur, Nawabganj
Bihar	Bhojpur, Kishanganj, Purnea
Jharkhand	Ranchi, Gumla, West Singhbhoom
Odisha	Bhadrak, Puri, Dhenkanal
West Bengal	Dakshin Dinajpur, Burdman, Cooch Behar
<i>Source: Rice Seeds: A Study of Availability and Accessibility in Bangladesh and India</i>	

Besides, interviews and interactions with other stakeholders were organised. Their inputs were also gathered through several workshops and media interactions – at state and national levels – organised under the project.

Identification of Rice Seed Varieties Informally Traded and Major Issues

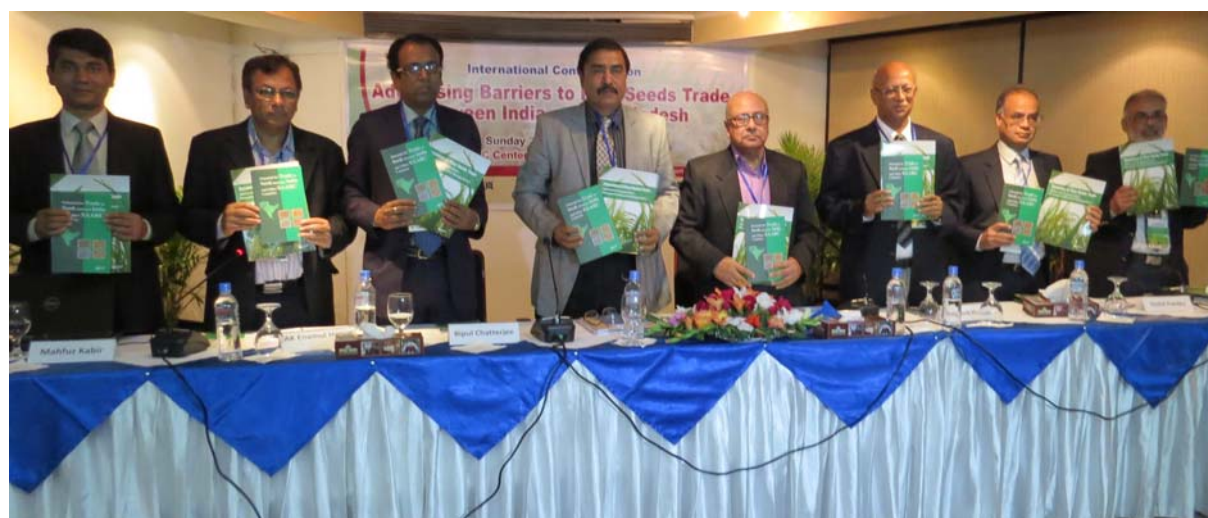
Interactions with farmers and other stakeholders reveal that many of the varieties produced in Bangladesh and India, as indicated earlier, are popular in both the countries. Some of these include BR-11, BRRI Dhan-28 and BRRI Dhan-29 (Bangladeshi varieties in India); and Swarna (including Guti and Sada), Parijat, Somsor, Swampa, Mamun (Indian varieties in Bangladesh). A list of such varieties is enclosed in the box below (Box 5.3).

Identification of Points of Informal Trade in HYV Rice Seeds

Variety seeds available across the border are informally traded and reach farmers in Bangladesh and India through several border points. The main points of such trade are district centres of Jiban Nagar, Jessore district, Benapole, Kushtia, Pragpur, Khulna, Darshana, Rajshahi, Godagiri, Dinajpur, Lalmonirhat, Burimari, Nawabgunj, Sonamasji, and also some other points. Traders in groups of 3-10 on an average participate informally in such trade.

Box 5.3: Rice Seeds Varieties Informally Accessed and Major Features			
	Jessore	Dinajpur	Chapai Nawabganj
1. Informal rice seeds trade varieties	Swarna (Lalswana, Guti), Minikit (Zira Minikit)	Swarna, Swampa, Parija, Mamun	Swarna (Guti and Sada), Parija, Somsor
2. Certified Seeds of Indian HYV	Certified seed of 30-kg bag are available	Certified seeds are unavailable but farmers produce locally	Certified seeds aren't available but farmers produce locally
3. Germination problem of Indian HYV	Germination problems is not found	Germination problem for Indian HYV is lower than that of Local HYV	Parijat variety has germination problem
4. Informal Trade frequency	Frequent informal trade across borders	Occasionally trade between borders and farmers produce locally after taking from Indian neighbor	Informal trade is not regularly occurring

Source: Rice Seeds: A Study of Availability and Accessibility in Bangladesh and India



Release of the report 'Dynamics of Rice Seed Trade: Need for Cooperation between India and Bangladesh' and 'Potential for Trade in Seeds between India and Other SAARC Countries' at the Dhaka International Conference December 21, 2013

Interactions with Stakeholders and its Outcomes

During the project period, the implementation team interacted with a gamut of stakeholders in Bangladesh and India directly or indirectly engaged in HYV rice seed supply chain. Some major ones include government officials and seed certification agencies, seed producers, seed associations, seed traders, research and development institutions and farmers. These interactions helped the research team to create space for greater engagement between stakeholders of the two countries.

Some of the major outcomes from interactions with stakeholders are briefly delineated below.

Creation of a Soft Ground through Interactions with Stakeholders

The project perhaps for the first time brought in several stakeholders involved in HYV rice seed supply chain in the two countries on a single platform. This helped in addressing several apprehensions and issues prevalent among stakeholders, particularly seed producers and seed associations, in the two countries. Further, the project has been able to generate stakeholders' perspectives which in turn could facilitate further interactions and engagements.

Stakeholders at Consensus for Trade and Cooperation in HYV Rice Seeds

It seems stakeholders, including government officials, on both sides of the border are aware of informal trade and its associated benefits. It is noticed that despite being aware of the issue, authorities do not take action to prevent this from occurring, primarily because of its need and importance arising from inadequate availability and accessibility in the local market place. Many of these stakeholders with whom the research team interacted seem to be aware of major concerns that could emerge as a result of this informal trade, for example the issue of seed adulteration and quality.

Most of the stakeholders are at consensus and argue that considering the importance of the issue, there is urgent need for government initiatives towards formalisation of trade and greater cooperation. Such developments could help farmers in getting assured quality of seeds and thus could help in food security to farmers. Formal trade will eliminate demand-supply gaps. Availability of more seeds and quality production of rice will help farmers use certified seeds and foundation seeds.

Seed Associations of Bangladesh and India Coming Closer

Continuous interactions with apex seed associations of Bangladesh (Bangladesh Seed Association) and India (National Seed Association of India) helped the project garner useful support from the two associations. For the first time, the two apex seed associations agreed to share market related and other information and support formalisation of HYV rice seed trade between the two countries. To formalise their relationship, they are likely to sign a memorandum of understanding (MoU) soon.

Greater Awareness Among Media Personnel

Continuous interaction with media was made an integral part of the project activities. Since the inception of the project, a number of activities focusing on creating awareness and dissemination of research findings among media personnel were carried out.

Project activities through active engagement of media personnel have generated greater awareness among them. This is reflected and reinforced by publication of research findings in prominent media channels in both Bangladesh and India. Print media in Bangladesh and India in four languages – English, Bangla, Hindi and Odiya dailies – extensively covered the project findings

and outputs. These helped the project to effectively disseminate research findings among relevant stakeholders.

In addition, awareness on the issue among media personnel was further facilitated through five media workshops and several interactions with media personnel in the four Indian states (Bihar, Jharkhand, Odisha and West Bengal) and Bangladesh. This resulted in publication of about 100 articles showing research findings and recommendations. About 60 selected articles have been published in the form of a compendium. These include 34 from India and 26 from Bangladesh.

5

Conclusion and Recommendations

Conclusion

Availability and accessibility to quality rice seeds is a critical element for ensuring food and livelihood security for the people of Bangladesh and India. Considering that farmers in both the countries suffer from lack of availability and accessibility and there are alarming gaps between HYV seeds desired by farmers and their availability, trade and cooperation between the two countries could be used as a tool to address this gap.

Bilateral cooperation of HYV rice seed trade has potential to attain the twin objectives of availability and affordability of quality rice seeds. One specific benefit that can be derived from such cooperation is the benefit of diversification of rice seed varieties as opposed to mono variety trade. Many of the local and modern HYV rice seeds have the potential to be utilised in both the countries, due to the similarity of agro-climatic conditions across the borders. In this light, one can argue that formalisation of rice seeds trade will further the market opportunities for small seed entrepreneurs and will go a long way in meeting the quality rice seeds demands from both sides of the border.

Towards trade and cooperation between the two countries, currently it is observed that while there are a number of enabling factors that support trade in seeds of various crops, such as similarity in agro-climatic conditions and food habits; in case of HYV rice seeds, there are issues like these varieties being a notified crop in both the countries, lack of understanding on knowledge sharing and trade, lack of harmonisation in seed laws, regulation and policies, issues relating to IPRs, apprehension of local stakeholders (fear of external dependence), and also industry's fear of market capturing by the other party. To facilitate trade and cooperation in HYV rice seed, issues relating to informal trade, knowledge sharing and IPRs need to be addressed. This will create an enabling environment for trade and cooperation between the two countries.

What is important to mention is that stakeholders in both the countries now seem to be at consensus to create an era of cooperation in HYV rice seed. In the light of some major project achievements, the following initiatives recommended below will further strengthen the development.

Recommendations

1. Need for creating a framework of cooperation	<ul style="list-style-type: none">• Such a framework could identify and include major areas for cooperation and specific steps and initiatives required towards achievement of the set objectives. The areas identified for cooperation should be based on concrete facts and national requirements. This can be aided by an
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	<p>especially constituted joint subject expert group comprising of scientists from agriculture universities and institutions.</p>
<p>2. Formalisation of trade</p>	<ul style="list-style-type: none"> • This call for three major initiatives: <ul style="list-style-type: none"> o Mutual acceptance of variety released: this calls for some amendments/changes in the way variety rice seeds are placed. Presently, it is a notified crop which restricts free movement of seeds across the border. o Mutual acceptance of seed certification and quarantine procedures: this will pave way for free movement of variety seeds across the border. o Infrastructure building, especially with regard to quarantine facilities: Many of the land border points, especially on Indian side, are yet to have quarantine facilities.
<p>3. Knowledge sharing</p>	<ul style="list-style-type: none"> • To counter emerging challenges of low yield and adverse impacts of climate change, there is need for sharing new ideas, technology, and methods, and creating awareness. The task is not difficult considering that a large number of rice seed varieties being used in India and Bangladesh have come through a common source, IRRI. • It is an opportune time for institutions like BRRI and BADC in Bangladesh and DRR, CRRI and ICAR in India to collaborate for sharing knowledge and expertise. An area that is equally important for both the countries is collaboration in stress-tolerant varieties. Achieving this could be a milestone towards fuller cooperation between the two countries.
<p>4. IPRs</p>	<ul style="list-style-type: none"> • Both Bangladesh and India have framed their rules and regulations with regard to plant variety protection, primarily under international obligations. Rules and regulations in both the countries are tuned to serve national objectives of making the seed sector vibrant and progressive. These, while protecting the interests of breeders also protect farmers' interests, the largest source of variety seeds in the two countries. • In the light of difficulties faced by farmers in the two countries, there is need for extending the scope and coverage of rules and regulations beyond the national boundaries, leading to harmonisation of seed laws and regulations, and also joint development and research in identified varieties. • There are various ways to resolve the issue of IPRs in variety rice seeds. Governments of the two countries should could come forward and agree to: <ul style="list-style-type: none"> o Existing HYV seeds that have been developed through public institutions and international organisations like IRRI should be made accessible freely with no IPR attached; o Licensing arrangement is another potential means for addressing the issue of IPRs in variety rice seeds. Under such an arrangement, public

	institutions owning the variety can licence production and marketing in another country.
5. Need for creating awareness on recently signed tripartite protocol between Bangladesh, India and Nepal	<ul style="list-style-type: none"> • There is need for creating awareness and a roadmap towards achievement of its full potential. Further, both the countries should make full use of the recent agreement on sharing of evaluation data of varieties released in their respective countries for release and commercialisation. This agreement is loaded with provisions to facilitate cooperation, knowledge sharing and trade in varieties, including rice seeds.

Attending to the recommendations made above could help Bangladesh and India create an environment for trade and cooperation in variety rice seeds. This could further lead to opening up a huge opportunity for bilateral cooperation in agriculture between India and Bangladesh. Both India and Bangladesh can gain from their collective efforts. It will not only help governments to attain their objective of ensuing food security to the nation but also develop the agriculture sector, a major contributor to the GDP as well the biggest source of employment generation in the country.

Given the progress made by the project and the emerging possibility of trade, it is critically important to take forward this message through undertaking activities such as awareness generation; building capacity of seed traders to fully participate in trade; and facilitating cooperation and collaboration between seed companies in the two countries.

Annexures

Annex 2.1: Global Seed Dynamics: Market Size, Export and Import 2012					
Value (USD million)	Export (MT)*		Country rank based on market size	Import (MT)*	
	Field Crops	Total		Field Crops	Total
12,000	364,117	382,469	1. USA	232,340	247,424
9,950	31,977	38,732	2. China	36,348	43,961
2,800	586,289	594,660	3. France	135,980	142,294
2,625	53,788	53,992	4. Brazil	30,083	30,956
2,120	193,559	193,780	5. Canada	51,200	54,757
2,000	-	6,734	6. India	18,700	20,631
1,350	4,500	5,634	7. Japan	42,355	47,891
1,170	100,752	103,294	8. Germany	178,954	183,846
990	42,757	43,114	9. Argentina	32,398	32,657
767	94,722	104,951	10. Italy	206,124	211,793
35,772	1,472,461	1,527,360	Total (10)	964,482	1,016,210
44,925	2,835,271	2,959,276	World	220,0488	2,334,678
79.6	51.9	51.6	Share (top 10 countries in %)	43.8	43.5

*Only trade in seeds over one metric tonnes included
Source: International Seed Federation

Annex 2.2: Share of six major countries in global market size, export and import 2012					
Seed market size (US\$ mn)	Field crops import*	Total seed import*	Country rank in global market size	Total seed export*	Field crop export*
12,000	232	247	1. USA	382	364
1170	179	184	8. Germany	103	101
2800	136	142	3. France	595	586
590	150	166	13. Netherlands	133	120
767	206	212	10. Italy	105	95
660	133	141	12. Spain	83	81
17,987	1036	1092	Total 6 countries	1401	1347
44,925	2200	2335	Total world	2959	2835
40	47	47	Share of 6 countries (%)	47	47

* Import and Export figures are in thousand MT. Source: Based on ISF data

Annex 2.3: Requirement and availability of certified/ quality seeds in India (quantity in '0000' MT)						
Crop	2010-11			2012-13		
	Requirement	Availability	Supply (% of requirement)	Requirement	Availability	Supply (% of requirement)
Paddy	82.56	91.6	110.95	78	80.32	102.97
Wheat	108.22	117.83	108.88	108.2	112.23	103.72
Maize	10.82	13.63	125.97	10.64	11.39	107.05
Cereal	201.6	223.06	110.64	196.84	203.94	103.61
Pulses	24.73	28.54	115.41	26.65	26.28	98.61
Oilseeds	63.42	72.84	114.85	58.92	68.51	116.28
Potato	29.97	17.34	57.86	21.62	17.32	80.11
Jute	0.4	0.48	120.00	0.36	0.37	102.78
Fodders	0.54	0.56	103.70	0.73	0.59	80.82
Non-cereal	119.06	119.76	-	108.28	113.07	-

Source: Ministry of Agriculture, Government of India, 2014

Annex 2.4: State-wise Requirement and Availability of Certified /Quality Rice Seeds in India (2011-2012 to 2013-14, Quantity in '0000' MT)												
States/UTs	2011-12				2012-13				2013-14			
	Demand	Availability			Demand	Availability			Demand	Availability		
		Govt.	Private	Total		Govt.	Private	Total		Govt.	Private	Total
Bihar	16	8	9	17	14	10	7	17	15	9	8	17
Jharkhand	6	1	0	1	5	3	0	3	3	3	0	3
Odisha	8	6	0	6	8	7	0	7	9	9	0	9
West Bengal	35	13	17	29	34	11	19	30	36	13	22	35
Total	330	181	173	354	315	161	167	329	335	168	180	347

Source: IndiaStat

Annex 2.5: India's export of vegetable and fruit seeds (Quantity in MT)				
Product	2001	2005	2009	2013
Seeds, vegetable, nes for sowing	3,294	2,718	4,093	7,308
Seeds, fruit and spores for sowing, nes	3,116	2,572	3,677	6,095
Seeds, lucerne (alfalfa), for sowing		110	785	3,072
Seeds of forage plants, except beet seeds, for sowing nes	1,103	582	716	2,293
Seeds, flower, for sowing	517	29	65	175
Seeds, rye grass, for sowing			0	58
Seeds, clover, for sowing		2	2	9
Sugar beet seed, for sowing		0	9	5
Seeds, Kentucky blue grass, for sowing				
Seeds, sugar beet, for sowing	386			
Seeds, beet, for sowing nes	2			
Seeds, Timothy grass, for sowing		98		
Total	8,418	6,111	9,347	19,015
<i>Source: ITC Trade Map 2014</i>				

Annex 2.6: India's import of vegetable and fruit seeds (Quantity in MT)				
Product label	2001	2005	2009	2013
Seeds, clover, for sowing		1,616	10,198	3,915
Seeds, vegetable, nes for sowing	735	927	2,469	2,557
Seeds of forage plants, except beet seeds, for sowing nes		0	200	331
Seeds, fruit and spores for sowing, nes	295	147	129	243
Sugar beet seed, for sowing		3	20	58
Seeds, rye grass, for sowing	0		5	54
Seeds, flower, for sowing	16	9	13	5
Seeds, Timothy grass, for sowing				
Seeds, fescue, for sowing				
Seeds, Kentucky blue grass, for sowing		2		
Seeds, sugar beet, for sowing	10			
Seeds, beet, for sowing nes	8			
Seeds, lucerne (alfalfa), for sowing				
Total	1,064	2,704	13,034	7,163
<i>Source: ITC Trade Map 2014</i>				

Annex 2.7: List of products imported by Bangladesh <i>Seeds, fruit and spores, for sowing (Quantity in MT)</i>			
Product	2001 Imported quantity	2009 Imported quantity	2013 Imported
Soya beans, whether or not broken		136,493	444,025
Rape or colza seeds, whether or not broken	227,755	191,711	50,551
Flour and meals of oil seeds		435	17,915
Copra	35,631	19,134	15,854
Seeds, fruit and spores, for sowing	1,255	1,600	5,835
Medicinal plants	451	1375	3476
Oil seeds	29,436	20,951	484
Swede, mangold, fodder root, hay, lucerne (alfalfa), clover, etc.		692	258
Sunflower seeds, whether or not broken			18
Groundnuts, not roasted	476	3	10
Locust beans	17	1	7
Linseed, whether or not broken			5
Hop cones, fresh or dried		7	1
Cereal straws and husks		215	
Total	295,021	372,617	538,439
<i>Source: ITC Trade Map 2014</i>			

Annex 2.8: Requirement and Distribution of Seeds in Bangladesh										
Types of seed	2008-09					2012-13				
	Seed requirement (MT)	Distribution of seed in %				Seed requirement (MT)	Distribution of seed in %			
		BADC	DAE	Private	Total		BADC	DAE	Private	Total
Rice	305,550	17.8	18.7	7.1	43.6	305,625	23.2	16.5	12.7	52.4
Wheat	70,200	28.4	16.0	0.0	44.4	55,500	33.9	22.6	0.0	56.5
Maize	5,780	1.4	0.0	77.9	79.3	5,840	2.6	0.0	71.8	74.4
Total Cereal	381,530	19.5	17.9	6.9	44.3	366,965	24.5	17.2	11.7	53.4
Jute Seed	3,775	24.2	1.9	0.0	26.1	4,600	14.1	3.5	65.2	82.9
Pulse Seed	20,965	4.0	0.2	0.0	4.2	23,200	7.6	7.2	0.0	14.8
Oil Seeds	14,450	6.3	0.0	0.0	6.3	17,250	7.6	5.8	0.2	13.6
Vegetable	2,620	3.0	0.0	38.7	41.7	4,500	2.8	0.0	17.6	20.3
Spices Seed	144,362	0.2	0.0	0.1	0.3	161,000	0.1	0.0	0.1	0.1
Total (Other Crops)	186,172	1.6	0.1	0.6	2.3	210,550	1.9	1.4	1.9	5.1
Potato	410,000	3.3	0.0	8.5	11.8	675,000	2.4	0.0	6.7	9.1
Grand Total	977,702	9.3	7.0	6.3	22.7	1,252,515	8.8	5.3	7.3	21.4
<i>Source: Ministry of Agriculture, Government of Bangladesh</i>										

Annex 3.1: Processes followed in variety development and release in Bangladesh and India

Bangladesh

- HYV development for self-pollinated crops such as rice is predominantly carried out in the public sector.
- Basic genetic material from which new varieties are developed is made available from the agriculture research institutions and agriculture universities' own resources and from the National Bureau of Plant Genetic Resources (NBPGR) in India and Bangladesh National Information Sharing Mechanism (BNISM) in Bangladesh
- Indian Council of Agricultural Research (ICAR), Bangladesh Agricultural Research Council (BARC) and agricultural universities carry out coordinated crop improvement projects at their different research stations and centres focusing on various agro-climatic zones.

India

- New varieties are developed by State Agriculture Universities (SAUs), ICAR institutes, and private companies
- Varieties that show some promise are entered into the All India Coordinated Trials (AICT) operated by SAUs, ICAR institutes, and State Agricultural Departments under the auspices of ICAR
- Results of the AICT are presented at the respective annual workshops of participating scientists working on the particular variety
- Recommendations are formulated for submission to the variety release sub-committee of the Central Seed Committee (CSC) who makes final recommendations to the Agriculture Ministry, based on which varieties are released and notified

Annex 3.2: Some agreements signed by Bangladesh for knowledge sharing in agriculture

- MoU between Bangladesh and Bhutan (signed on September 11, 2012) on Agricultural Cooperation focusing on agricultural research, germplasm exchange, human research development for the scientific professionals in the Integrated Pest Management (IPM), horticulture development, and crop improvement programme of Bhutan, training to Bhutan in soil fertility management through organising training programme and exchange visit;
- MoU between Bangladesh and Jordan (signed on December 28, 2011) on ‘cooperation in the field of agriculture’ in. The MoU emphasises, among others, on human resource development, exchange of germplasm of crops and related technologies, training of agricultural experts and farm mechanisation;
- MoU between Bangladesh and Fiji (signed on October 22, 2012) on agricultural cooperation to promote agricultural technical progress and economic advancement by increasing production, improving yields, producing better varieties of crops, reducing imports and ensuring food security. The MoU will be valid for a period of five years and shall be extended automatically for a subsequent period of two years thereafter;
- MoU between Bangladesh and Myanmar (signed in August 2012) to jointly produce rice, lentil, oil, cotton and other crops on the South Sudanese lands leased by Bangladesh to ensure food security of both the countries. The two countries will also exchange training, technologies and expertise for increased agricultural productivity;
- MoU between the Ministry of Agriculture of Bangladesh and the Ministry of Agriculture and Cooperatives of Thailand (signed on December 21, 2012) on cooperation in agriculture, fisheries, and livestock; MoU between Bangladesh Agricultural Research Council (BARC) and Sri Lanka Council for Agricultural Research Policy (SLCARP) (signed in April 2011), on cooperation in agriculture;
- Besides, MoUs between Bangladesh and Morocco; Bangladesh and Cambodia; and Bangladesh and Belarus have been signed. In addition, an MoU between Bangladesh and Brunei is in the process of finalisation. These MoUs seek to facilitate scientific and technical cooperation between Bangladesh and other countries.
- Furthermore, different public institutions in Bangladesh like agricultural universities and research institutions also have signed various MoUs with different organisations across the globe for greater agricultural cooperation and knowledge sharing.

It is, however, noted that activities conducted under these MoUs are usually not revealed for unknown reasons.

Source: compiled by the authors

Annex 3.3: Some India's Initiatives towards knowledge sharing

1. Africa and India cultivate agricultural research ties

India and Africa are implementing seed programme to improve availability of seeds in Africa. Presently they are running trials under the Syngenta Foundation for Sustainable Agriculture's India-Africa Seed Bridge project. The project is designed to link plant breeders with new seed production and distribution channels in emerging markets.

Major crops included in the programme include crops such as sorghum, millet, sunflower, tomato, onion and sesame, as well as maize that require less water than traditional varieties, cowpea that is resistant to the pod borer moth, salt-tolerant rice and bananas that are resistant to the fungal 'wilt' disease.

Efforts are also being made to build links to help Nigeria's mission to grow genetically modified cotton, based on India's success in the sector. There is also likelihood that Nigeria and India could increase collaboration in capacity building, technology transfer and the development of infrastructure such as modern laboratories in the agriculture sector.

Source: Africa and India cultivate agricultural research ties (emphasis added) <http://www.scidev.net/global/biotechnology/feature/africa-and-india-cultivate-agricultural-research-ties.html>

2. U.S.-India-Africa Triangular Partnership to Improve Agricultural Productivity and Innovation

As part of the India-US Strategic Partnership, India and the US agreed to use the expertise of both countries in agricultural capacity-building and to extend food security to third countries. In pursuit of this, both the countries jointly launched a three-year triangular India-US-Africa partnership in agricultural training. In the first programme in January 2013, 30 trainees from three African countries – Kenya, Liberia and Malawi participated.

The two-month training program covered 15 major themes of agricultural extension management and included study tours to different parts of the country.

The triangular partnership program aims to improve agricultural productivity, strengthen agricultural value chains, and support market institutions in Kenya, Liberia, and Malawi. The programme will train 180 mid-level African Government and private sector agriculture professionals from Kenya, Malawi, and Liberia in agricultural extension practices, agri-business, and agricultural marketing.

Source: Ministry of Foreign Affairs, Government of India, January 16, 2013, (emphasis added) <http://mea.gov.in/press-releases.htm?dtl/21058/USIndiaAfrica+Triangular+Partnership+to+Improve+Agricultural+Productivity+and+Innovation+in+African+Countries>

3. Africa-India Framework for Cooperation

Agriculture

Africa and India agree that agricultural development is an effective approach to ensure food security, eradicating poverty and improve peoples' livelihood, and agree to strengthen Africa and India cooperation in this sector in order to improve the food security of Africa and to increase its exports to world markets. They emphasise sustainable development of agricultural and animal resources with effective support for scientific research for conservation of land and environment. The cooperation will focus on the following areas:

- Capacity building and sharing of experience in policy analysis and planning relating to agriculture sector;
- Cooperation in water resource management and irrigation practices, agro- infrastructure development, transfer of applied agricultural technology and skills transfer;
- Cooperation to combat agro-based diseases;
- Capacity building/ training for increasing the capacity of small landholder African food producers to comply with the required quality and safety standards, including extension activity and agricultural credit policies;
- Sharing experiences and information on appropriate storage and processing technologies and jointly promoting the uptake of African and Indian developed technologies for diversification and value addition in relations to food and agricultural products;
- Sharing of expertise and information between commodity boards of Africa and India with a view to learning from each other's experiences in farm mechanisation, post-harvest technology, organic farming, policy and regulatory frameworks and setting up of cross-border commodity exchange boards;
- Enhancing market opportunities for African value added agricultural products;
- Cooperation in livestock management, breeding technologies, meat processing, dairy industry development, fisheries and aquaculture, including exchange and transfer of applied technology;
- Establishing linkages between agriculture and industrial development in order to support and nurture agro-processing industries; and
- Enhancing cooperation between agricultural training centres and relevant research institutes.

Source: Adapted from India-Africa Forum Summit 2008, New Delhi, 8-9 April 2008

Annex 4.1: Patents vs Plant Variety Protection

Patents and plant variety protection (PVP) are two different forms of intellectual property rights. Like any IPR, both patents and PVP provide exclusive monopoly rights over a creation for commercial purposes over a period of time. A patent is a right granted to an inventor to prevent all others from making, using, and/or selling the patented invention for 15-20 years. The criteria for a patent are novelty, inventiveness (non-obviousness), utility, and reproducibility. Although patents were designed for industrial application, with biotechnology, patent offices now grant patents on micro-organisms and, in some countries, on all life forms.

PVP gives patent-like rights to plant breeders. What gets protected in this case is the genetic makeup of a specific plant variety. The criteria for protection are different: novelty, distinctness, uniformity, and stability. PVP laws can provide exemptions for breeders, allowing them to use protected varieties for further breeding, and for farmers, allowing them to save seeds from their harvest. In plant breeding, PVP is the weaker sister of patenting mainly because of these exemptions.

Adapted from Intellectual Property Rights: Ultimate control of agricultural R&D in Asia (2011), available at <http://www.grain.org/article/entries/30-intellectual-property-rights-ultimate-control-of-agricultural-r-d-in-asia>

Annex 4.2 : Evolution of IPRs in plant breeding

IPRs in plant breeding in India

IPRs in biological innovations or plant breeding and processes have never been part of the patent regime in India. Section 3(j) of the Patents Act states ‘plants and animals in whole or any part thereof other than micro-organisms but including seeds, varieties and species and essentially biological processes for production or propagation of plants and animals’ are not patentable. There are exceptions to this, as the Act makes it clear that processes leading to the development of Genetically Modified Organisms (GMO) constitute a patentable matter.²⁵

As noted above, the emergence of IPRs/patents on living organisms is a recent phenomenon in India, beginning with the advent of Trade-Related Aspects of Intellectual Property Rights (TRIPS) under the auspices of the World Trade Organisation in early 1995. Article 27.3(b) of the agreement requires signatory countries to provide protection for plants varieties in the form of patents or through establishing ‘an effective sui generis system’ of protection for plant varieties, a concept borrowed from the UPOV Convention 1991. TRIPS required all parties to make patents in case of both product and process (Box 4.2 provides linkages between international frameworks relating to IPRs and plant breeding or say, biological innovations).

International frameworks on seeds regulations	
<i>International framework</i>	<i>Regulating</i>
Trade Related Intellectual Property Rights (TRIPS), 1994 Article 27.3 (b): plant varieties can be excluded under an effective sui generis system UPOV Plant Variety Protection, 1991 Patent right for plant varieties that are new, distinct, stable and uniform	Use of commercial seeds: variety protections and property rights
UPOV Plant Variety Protection, 1991 Unauthorised propagation and sale of seed forbidden Government may allow on-farm seed saving for private use FAO International Treaty on Plant Genetic Resources for Food and Agriculture, 2001 Benefits from the use of plant genetic resources should flow to farmers collectively	Farmer-saved seeds
Convention on Biological Diversity, 1992 Recognise rights of countries over biodiversity Equitable sharing, and mutually agreed terms for access to genetic resources	Use of naturally occurring plants
<i>Source: Adapted from Helicke and Mansfield (2012)</i>	

IPRs in plant breeding in Bangladesh

Bangladesh is a party to the Convention on Biological Diversity (CBD). The country has also signed International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and is a WTO member with obligations under the TRIPs agreement. In line with the requirements of these global frameworks, Bangladesh drafted its Biodiversity and Community Knowledge Protection Act and Plant Varieties Act of Bangladesh in 1998. Further, there was a revision of later in 2003. The 2003 PVP draft revision specifically seeks to fulfil the obligation under Article 27.3 (b) of TRIPs.²⁶

It might be noted that domestic preparations to devise national laws are still underway.

Draft Plant Variety and Farmers' Right Protection Act 2014
<p><i>Important highlights</i></p> <ul style="list-style-type: none"> • New varieties will be termed as protected varieties and breeders will get exclusive rights to commercial use of seeds of that variety. It will not be possible to produce, reproduce, sell and market the seeds of the protected varieties without authorisation from the breeder; • Proposes 15-20 years of protection rights to breeders of various types of plants, but the government in certain cases will be able to limit breeders' rights. • Allows farmers, without commercial purposes, to produce, preserve, use, exchange and sell seeds of protected varieties. • Proposes farmers' right to protect traditional knowledge regarding plant genetic resources and the right to get benefit if anyone uses plant genetic resources • Proposes creation of a gene fund to conserve genetic resources • Provides for creation of national inventory of our genetic resources and protection of our local varieties and traditional knowledge

Annex 4.3: IPR linkages with plant breeding in Bangladesh and India

IPR integration with plant breeding in India

India, in line with the TRIPS guidelines, came out with the enactment of the Plant Variety Protection and Farmers' Right (PPV&FR) Act 2001.²⁷ The Act seeks to provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants. Such a system was considered necessary to protect the rights of the farmers in respect of their contribution made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties. At the same time, it was also considered important to protect rights of plant breeders which will in turn stimulate investment for research and development by both public and private sector with regard to development of new plant varieties. Further, it was expected that such protection will facilitate the growth of the seed industry in the country and will ensure the availability of high quality seeds and planting material to the farmers.

The approach was holistic considering that interest of both farmers and plant breeders were taken into consideration simultaneously. More importantly, it was consistent with India's obligations under the TRIPS Agreement. The preamble of the Act makes its linkage with the TRIPS very clear by mentioning '*... whereas India, having ratified the Agreement on Trade Related Aspects of Intellectual Property Rights should inter alia make provision for giving effect*'. The provision refers to Article 27.3(b) of the Agreement relating to protection of plant varieties.

There were five major objectives enshrined in the Act. These include: (1) providing an effective system for protection of plant varieties; (2) protecting the rights of farmers and plant breeders; (3) encouraging the development of new varieties of plants; (4) stimulating R&D investment and seed industry growth; and (5) ensuring the availability of high-quality seeds and planting materials to farmers.

The Indian PPVFR Act allows four types of varieties to be registered, namely extant variety,²⁸ new variety,²⁹ essentially derived variety and farmers' variety.

Following the enactment of the PPV&FR Act in 2001, the government of India established the PPV&FR Authority, which became operational in 2005 and began processing applications for varietal registration in 2007.³⁰

The move was welcomed by the private seed industry in the light of lack of capacity of the public sector to fully meet crop improvement research and seed requirement of agriculture and also increasing private sector participation in plant breeding. It was felt that PPV would stimulate research in both public and private sectors.³¹

Annex 5.1: A summary of achievements with respect to project goal and objectives			
Objective	Description	Major activities	Outcomes
Objective 1	Understanding of factors that drive demand and flow of HYV rice seeds in Eastern Indian States and Bangladesh to identify varieties with bilateral trade potential	<ul style="list-style-type: none"> • Literature review • 15 Farmers' FGDs (3 in each states in India and 3 in Bangladesh, covered about 500 farmers); • Interactions with seed producers; • Interactions with seed retailers; • Interactions with seed associations; • Interactions with research institutions; • Interactions with government officials 	<ol style="list-style-type: none"> 1. A clear understanding of factors that drive demand and flow of seeds 2. A clear understanding of adaptable Bangladeshi and Indian rice seeds varieties
Objective 2	Understanding of systemic enabling factors and challenges to bilateral knowledge sharing and trade in seeds between India and Bangladesh, particularly on HYV rice seeds	<ul style="list-style-type: none"> • Literature review • Interactions with seed producers and retailers; • Interactions with seed associations; • Interactions with research institutions; • Interactions with government officials, including certification and quarantine agencies 	Clear understanding of challenges and enabling factors
Objective 3	Influencing changes to policies and practices to facilitate formalisation and expansion of trade and knowledge-sharing on HYV rice seeds between Bangladesh and India	<ul style="list-style-type: none"> • Production and dissemination of reports, research papers and articles; • Five state and national level consultations (4 in India and 1 in Bangladesh); • International conference at Dhaka (active participation of 110 stakeholders from varying background); • Five media briefing workshops (4 in India and 1 in Bangladesh); • Continuous interaction with stakeholders (government agencies, research institutions, national and state level seed associations, and others) • Initiatives to facilitate cooperation between relevant and similar institutions in both the countries 	Stakeholders at consensus towards promotion of knowledge sharing and trade in HYV rice seeds

Source: RISTE project documents available at www.cuts-citee.org/RISTE

Endnotes

- 1 The report can be accessed at http://cuts-citee.org/riste/pdf/Dynamics_of_Rice_Seeds_Trade-Need_for_Cooperation_between_India_and_Bangladesh.pdf
- 2 The report can be accessed at http://cuts-citee.org/riste/pdf/Rice_Seeds-A_Study_of_Availability_and_Accessibility_in_Bangladesh_and_India.pdf
- 3 DGCIS Annual Export
- 4 It needs to be noted that in the absence of official provision for trade in variety rice seeds, data on rice seeds trade for both India and Bangladesh sourced from ITC Trade Map and presented in this report is limited to hybrid seeds, unless otherwise specified. ITC Trade Map does not explicitly classify variety/hybrid seeds.
- 5 Recommendatory paper, Benefits and Constraints to HYV/Hybrid RiceSeeds Trade and Knowledge-sharing between Bangladesh and India, available at http://cuts-citee.org/riste/pdf/Recommendatory_Paper-RISTE.pdf
- 6 Rice Seeds: A Study of Availability and Accessibility in Bangladesh and India, available at http://cuts-citee.org/riste/pdf/Rice_Seeds-A_Study_of_Availability_and_Accessibility_in_Bangladesh_and_India.pdf
- 7 The Protocol is signed by the Secretary, Ministry of Agriculture of the three countries – Bangladesh, India and Nepal in Kathmandu – on October 18, 2014. It was facilitated by IRRI.
- 8 Knowledge sharing can be broadly defined as the process of exchanging knowledge or information in the form of skills, experience and understanding among relevant stakeholders. This can relate to and aim for improvement in production, marketing and distribution of agricultural produce through engagement of relevant stakeholders. Knowledge sharing can be achieved in two ways: (i) sharing of intermediary product embedded with technology and knowledge; and (ii) sharing of processes involved in creation of a technology. Going by this definition and in the present context, we presume any movement of intermediary products and processes is knowledge sharing. Such knowledge sharing could occur within and beyond the national boundaries depending on the type of product and adaptability.
- 9 International Rice Research Institute, <http://irri.org/our-work/locations/bangladesh>
- 10 International Rice Research Institute, <http://india.irri.org/our-work>
- 11 See Dynamics of Rice Seed Trade: Need for Cooperation between India and Bangladesh, http://cuts-citee.org/riste/pdf/Dynamics_of_Rice_Seeds_Trade-Need_for_Cooperation_between_India_and_Bangladesh.pdf
- 12 For example, there are provisions under the agreement ‘Regional Seed Bank’ signed by eight South Asian countries, including Bangladesh and India, to address such issues. The agreement seeks to provide regional support to national seed security efforts; address regional seed shortages through collective actions and foster inter-country partnerships; to promote increase of Seed Replacement Rate (SRR); and to act as a regional seed security reserve for the Member States. See Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India, Establishing of the SAARC Regional Seed Bank, <http://seednet.gov.in/saarc-seedbank.pdf>
- 13 IRRI worked as a facilitator and played catalytic role in signing of this agreement. The agreement was made during the Regional Cooperation on Seed Issues workshop in Kathmandu, Nepal on 18 October 2014, See International Rice Research Institute, <http://irri-news.blogspot.in/2014/10/bangladesh-india-and-nepal-sign.html>
- 14 Africa and India cultivate agricultural research ties, <http://www.scidev.net/global/biotechnology/feature/africa-and-india-cultivate-agricultural-research-ties.html>
- 15 World Intellectual Property Organisation
- 16 World Trade Organisation

- 17 For example, India witnessed an increase in its agricultural production by more than 350 percent from 50.82 million tonnes in 1950-51 to 230.67 million tonnes in 2007-08. While the increase in the land area under cultivation was a mere 27.87 percent, the increase in yield per hectare of land was 255 percent; from 522 kg/hectare in 1950-51, to 1,854 kg/hectare in 2007-08. Source: Mrinalini Kochupillai (2011), India's Plant Variety Protection Law: Historical and Implementation Perspectives, file:///C:/Users/hp3/Downloads/SSRN-id1780230.pdf
- 18 UPOV is a small intergovernmental organisation that administers common rules for the recognition and protection of PVP internationally. There are 46 members, and most of them are industrialised countries, which currently operate under the UPOV Convention of 1978 or 1991. For details, see The International Union for the Protection of New Varieties of Plants (UPOV), <http://www.upov.int/portal/index.html.en>
- 19 The TRIPS Agreement is part of the 'single undertaking' implying that it applies to all WTO members.
- 20 Protection of Plant Varieties and Farmers' Right Authority, Frequently Asked Questions
- 21 For major challenges to seed availability and accessibility, see Rice Seeds: A Study of Availability and Accessibility in Bangladesh and India, http://cuts-citee.org/riste/pdf/Rice_Seeds-A_Study_of_Availability_and_Accessibility_in_Bangladesh_and_India.pdf
- 22 OAPI member include Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Gabon, Guinea, Equatorial Guinea, Mali, Mauritania, Niger, Guinea Bissau, Senegal and Togo. Source: World Intellectual Property Organisation
- 23 CUTS International (2014), Rice Seeds: A Study of Availability and Accessibility in Bangladesh and India
- 24 All research papers and reports produced under the project can be accessed at www.citee.org/RISTE
- 25 Indian Patent Act 1970, Chapter 2, Section 3, Inventions Not Patentable, http://www.ipindia.nic.in/ipr/patent/eVersion_ActRules/sections/ps3.html
- 26 World Intellectual Property Organization (2013), Developing National Intellectual Property Policy for Bangladesh, available at http://dpdt.portal.gov.bd/sites/default/files/files/dpdt.portal.gov.bd/notices/5c4a8a90_d825_46f9_8cc8_3505e47e0053/IP%20Policy.KS.pdf
- 27 The Protection of Plant Varieties and Farmers' Rights Act, 2001 <http://agricoop.nic.in/PPV&FR%20Act,%202001.pdf>
- 28 Varieties bred by the public and private research system and officially released for cultivation by the state or Central government and have not completed 15 years
- 29 New varieties are essentially derived varieties guided by the distinctness, uniformity and stability (DUS) criteria.
- 30 *Ibid.*
- 31 P Sateesh Kumar, S M Khan, Manpreet Hora and M Prabhakar Rao, Implementation of Indian PV&FR Act and Rules: Inadequacies Leading to Avoidable Litigations, Journal of Intellectual Property Rights, Vol 16, March 2011

About the RISTE Project

CUTS International is implementing a project entitled 'Addressing Barriers to Rice Seeds Trade between India and Bangladesh' (in short, RISTE Project) with the support of Bill and Melinda Gates Foundation. Its duration is 21 months, i.e. January 2013-September 2014. Besides Bangladesh, the project is being implemented in four states of Eastern India, viz. Bihar, Jharkhand, Odisha and West Bengal.

The goal of the project is to develop an enabling environment to promote seeds trade and knowledge-sharing in HYV rice seeds between India and Bangladesh.

The objectives of the project are to understand factors that drive demand and flow (production, marketing and use) of HYV rice seeds in Eastern Indian States and Bangladesh; to identify varieties with bilateral trade potential; understanding systemic enabling factors and challenges (institutions, laws, policies, regulations and practices) to bilateral knowledge-sharing and trade of seeds between India and Bangladesh, particularly on HYV rice seeds; and to facilitate formalisation and expansion of bilateral trade and knowledge-sharing on HYV rice seeds varieties between Bangladesh and India.

For details, please visit: www.cuts-citee.org/RISTE/

About CUTS

With its headquarter in Jaipur, India; Regional Centres, in Lusaka, Nairobi, Accra and Hanoi; and an International Centre in Geneva, CUTS International has three verticals: Trade, Regulations and Governance. Through policy- and action-research, advocacy, networking and capacity building, it has established its relevance and impact in several policy-making areas and among the larger development community.