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STRENGTHENING BANGLADESH-INDIA RICE SEEDS COOPERATION: BANGLADESH PERSPECTIVE

Abstract

This paper is an attempt to understand the prospect for strengthening rice seeds cooperation between Bangladesh and India in modern varieties. Both the countries are trying to achieve food security through improvements in rice production, marketing, and research and development in rice seeds. Bangladesh and four states of eastern India belong to similar agro-climatic zone where rice is overwhelmingly placed as a major staple food. However, due to absence of policy and regulatory barriers to rice seeds trade in modern varieties, there are anecdotal evidences of informal flow of rice seeds across the border, which is risky for both producers and consumers. The paper finds that there is a notable presence of informal cross-border trade of many varieties of rice seeds in three bordering districts in Bangladesh. The paper suggests some doable measures to strengthen rice seeds cooperation between the two countries through, inter alia, trade formalisation, making use of SAARC seed bank, joint research and release of new modern varieties, and harmonising standards and certification procedures.

1. Introduction

With declining agricultural land and increasing population, food production is gaining the utmost importance. Farmers of Bangladesh and India cultivate varieties which are traded informally between the two countries. There is a need to formalise seed trade to meet farmers' demand for quality seed input. Similar agro-climatic condition and food habits in Bangladesh and four eastern Indian states, viz. West Bengal, Odisha, Bihar and Jharkhand, allow a wide range of possibilities for bilateral cooperation. Rice being a staple food in both the countries offers plenty of scope for cooperation and collaboration. It would open up a window of opportunities in agricultural cooperation in much broader context in bilateral or multilateral form.

Seeds influence and direct entire agricultural scenario of a country as the most vital agricultural input. As staple food of Bangladesh, rice exerts considerable influence in determining socio-political-economic realities of Bangladesh as illustrated in World Bank report titled "Bangladesh: Rice is Life".[1] Rice contributes about one-third and

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[1] World Bank Report, available at http://www.worldbank.org/html/cgiar/newsletter/june97/9bang.html, accessed on 20 October 2014.

two-thirds of calorie intake in India and Bangladesh, respectively. Rice production has undergone significant transformation in past few decades, which has been heavily dependent on and regulated by government. It has almost quadrupled in the last four decades at much higher rate than population growth, which helped Bangladesh attain self-dependency in food production in the face of decreasing land availability and adverse natural and economic shocks.

Graduation from traditional varieties to modern techniques and high yielding varieties (HYV) made farmers more dependent on inputs. Bangladesh is pursuing high input and high output agricultural policy, which opens up opportunities for supplying agricultural input to farmers by private enterprises. Agricultural input market is gradually becoming market-oriented through involvement of private for-profit sector, donor communities and NGO activities beside government intervention.

Against this backdrop, it is widely perceived that there are significant potentials for enhancing rice seed trade between Bangladesh and India, especially the four eastern Indian states mentioned above. This opportunity stems mainly from past market dominance of Indian seeds, similar agro-climatic condition and cost advantage over alternative options. It is assumed that Bangladesh can benefit in exporting rice seeds to India for *Boro* season and importing from India for *Aus* and *Aman* seasons by utilising their respective comparative advantages. The benefit would be extended to greater cooperation beyond seeds trade for attaining further mutual gain. The focus of this paper is, therefore, on understanding of rice seed sector and exploring the barriers and potential of seed trade between the two countries.

The rest of this paper has been organised as follows. Section 2 undertakes a comparative analysis of rice production and yield performance in Bangladesh and India, and Bangladesh's import of rice seeds along with some discussion of policy and regulations pertaining to seed trade. Section 3 presents the findings of a primary field study to understand the nature and extent of cross-border informal flow of rice seeds between Bangladesh and India which needs to be formalised. Section 4 identifies the barriers of trade and issues related to trade facilitation for formal movement of rice seeds. Finally, concluding remarks and some doable policy options have been suggested in Section 5 to strengthen cooperation in rice seeds trade between the two countries.

2. Rice Cultivation and Seed Sector

2.1 *Rice Cultivation in Bangladesh*

In Bangladesh the rice-growing environment has been classified into three major ecosystems based on physiographic characteristics and land types. These ecosystems are (a) irrigated, (b) rain-fed, and (c) floating or deep water. The rain-fed ecosystem has been further classified as rain-fed lowland and rain-fed upland. Thus,

all rice varieties cultivated in the country are grouped into five distinct ecotypes, such as (a) *Boro*, (b) Transplanted *Aus* (T. *Aus*), (c) Transplanted *Aman* (T. *Aman*), (d) Upland *Aus* (direct-seeded *Aus*), and (e) Deep water rice (floating rice). *Boro* rice is grown completely under irrigated ecosystem during the dry period (November to July) while T. *Aman* (during July to December), T. *Aus* (during April to August) and Upland *Aus* (during March to July) are cultivated under rain-fed ecosystem. Similar to India, there are three seasons for rice cultivation in Bangladesh, namely *Aus*, *Aman* and *Boro*. *Aman* is the highest rice production season.

Table 1: Trend of Rice Production in Bangladesh[2]

Year	*Aus*		*Aman*		*Boro*		Average MV %
	MV* %	% of production	MV %	% of production	MV %	% of production	
2001-02	36.20	11.65	50.73	52.97	94.64	35.38	64.57
2002-03	37.52	11.55	51.71	52.76	95.37	35.70	65.66
2003-04	37.60	11.11	52.59	52.46	94.72	36.43	66.27
2004-05	44.01	9.88	55.04	50.92	95.38	39.19	69.76
2005-06	49.97	9.82	58.82	51.56	95.72	38.62	72.20
2006-07	53.04	8.57	61.61	51.23	96.80	40.20	75.02
2007-08	61.01	8.69	67.38	47.74	97.27	43.57	79.85
2008-09	64.72	9.45	67.32	48.74	97.41	41.81	79.65
2009-10	65.79	8.67	66.63	49.88	97.72	41.45	79.44
2010-11	71.62	9.65	69.15	48.97	98.95	41.38	81.72

*MV= Modern Varieties

The trend of rice production in *Boro* season has been increasing over time. Adoption of modern varieties seed is increasing and 98.95 per cent of the seeds in *Boro* season are modern varieties. On average, use of modern varieties (MV) is 81.72 per cent. *Aus*, *Aman* and *Boro* have 6.6, 38 and 54 per cent share of total rice production respectively.[3] *Boro* is found to be the most productive season having the highest average yield of country. Therefore, *Aus* and *Aman* have the potential for adopting new varieties. However, newspaper citing statistics from Department of Agricultural Extension (DAE) reported 41 and 39 per cent decrease in acreage and production of hybrid rice, respectively, over the last five years despite various promotional activities by the government.

[2] Bangladesh Bureau of Statistics (BBS), *Statistical Yearbook of Bangladesh 2012*, Dhaka: Ministry of Planning, Government of Bangladesh, 2013.

[3] Finance Division, *Bangladesh Economic Review 2014*, Dhaka: Ministry of Finance, Government of Bangladesh, 2014.

From a farm level survey, it has been found that in 2004 *Aman* season, Swarna, an Indian variety was the second-most dominant variety primarily cultivated in districts bordering West Bengal despite having lower yield (3.79t/ha). The most dominant variety was BR11 (3.92t/ha) developed in 1981 which possess several desirable features for farmers like weed competitiveness or milling recovery. In *Boro* season, popular varieties are BRRI dhan-28 (5.11t/ha), BRRI dhan-29 (6.13t/ha), IR8 (5.99t/ha), BR8 (5.71t/ha), BINA 6 (5.38t/ha). BRRI dhan-28 gained popularity because of its shorter life cycle. It is matured in 2-3 weeks lesser time compared to other varieties. Indian varieties imported through informal exchange across the border were also grown in the *Boro* season. The most important of these varieties are Ratna, Bhajan, Miniket, Parija, Nayanmoni and Jaya. They were cultivated in nearly 9 per cent of the total *Boro* season area in 2005. They gained popularity because of their shorter maturity (Parija), drought tolerance (Nayonmoni), and superior grain quality (Miniket). The highest yielding variety was Bhajan with a yield of 5.99 t/ha. The highest number of varieties is cultivated in *Aus* season. Most of the varieties cultivated in this season were released for *Boro* season and have 1.5t/ha lower yield compared to *Boro* season.[4]

2.2 *Season-wise Production of Rice in India*

There are three seasons for growing rice in India, viz. autumn, winter and summer. These three seasons are named according to the season of harvest of the crop. Autumn rice is known as pre-*kharif* rice. The sowing of pre-*kharif* rice is taken up during May to August. However, the time of sowing slightly differs from state to state according to weather condition and rainfall pattern. It is harvested in September-October. Autumn rice crop is known as *Aus* in West Bengal, Beali in Odisha and Bhadai in Bihar. About 7 per cent crop is grown in this season. The varieties grown during this season are mostly varieties of short duration ranging from 90 to 110 days.

The main rice growing season in the country is the *kharif*. It is known as winter rice as per the harvesting time. The sowing time of winter (*kharif*) rice is June-July and it is harvested in November-December. Winter rice is known as *Aman* in West Bengal, Sarrad in Odisha, and Agahani in Bihar. About 84 per cent of the country's rice is grown in this season and medium to long duration varieties are generally cultivated in this season.

Summer rice is called as Rabi in India. It is known as *Boro* in Assam and West Bengal, Dalua in Odissa, and Garma in Bihar. The sowing time of summer rice is November to February and harvesting time is March to June. The area under cultivation of summer rice is only 9 per cent of total area and early maturing varieties are mostly grown in this season.

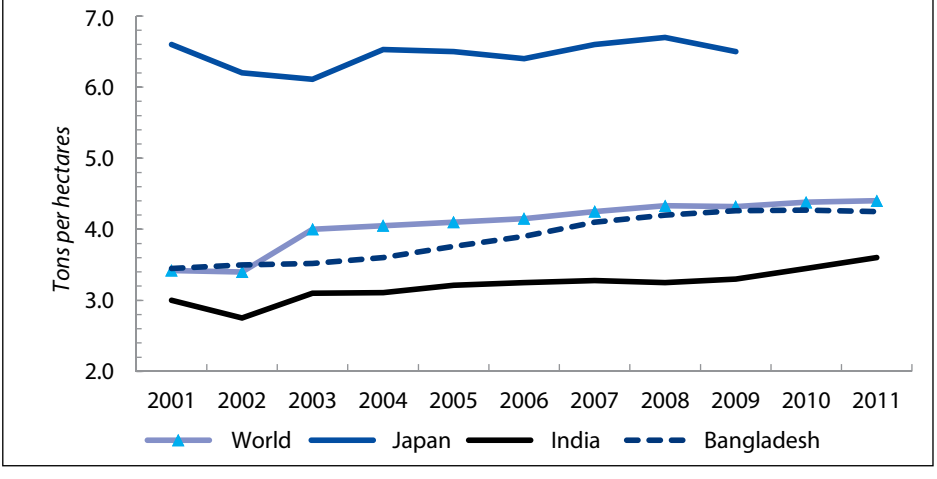
[4] M. Hossain, W. M. H. Jaim, M. S. Alam and A. M. Rahman, *Rice Biodiversity in Bangladesh*, Dhaka: BRAC Research and Evaluation Division, 2013.

2.3 *Comparative Yield of Rice*

Yield varies significantly according to seasons from 1.45t/ha to 6t/ha. Yield of the four eastern Indian states is also low. Being an important factor, quality of seed that farmers can control can significantly increase production. Also, modern varieties are developed suitable for irrigation system, focusing less on rain-fed system.

Bangladesh is experiencing higher yield rate of rice than that of India and it is around the world average for the last 6-7 years. In the Asian continent, Japan is in remarkable position for efficient rice production. Japan's yield rate is almost double compared to both the countries.

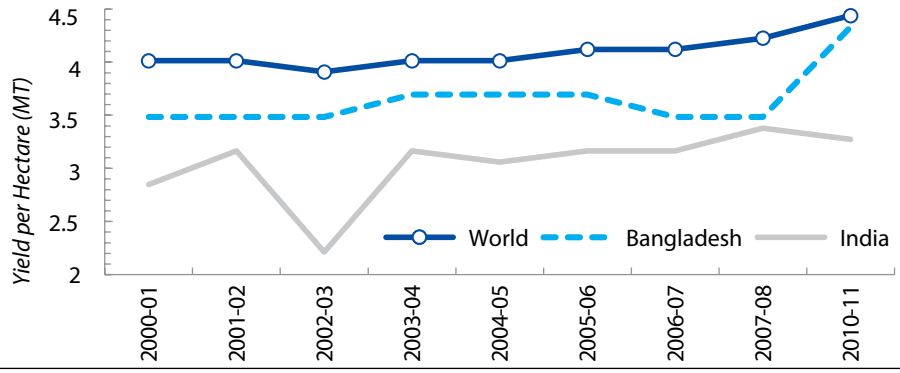
Figure 1: Trend of Rice Yield[5]



According to International Rice Research Institute (IRRI), seed is a living product that must be grown, harvested and processed correctly to maximise its viability and subsequent crop productivity.[6] It is always emphasised that good quality seed must be sown for optimum yield potential of any rice variety. Good/quality seed can increase yields by 5 to 20 per cent. Using good seed leads to lower seeding rates, higher crop emergence, reduced replanting, more uniform plant standard and more vigorous early crop growth. Vigorous growth in early stages reduces weed problems and increases crop resistance to insect pests and diseases. All of these factors contribute to higher yields and more productive rice farms.

[5] International Rice Research Institute (IRRI), *World Rice Statistics 2013*, Manila: IRRI, 2013.
[6] *Ibid*.

Figure 2: Trend of Paddy Yields (on Un-Milled Basis)[7]



Bangladesh's rice yield is close to the world average. Rice yield per hectare in Bangladesh is not very low in comparison to the world, whereas rice yield per hectare in India is much lower than that of the world. The position of eastern Indian states is similar to India's position compared to the world average. Low rice yield in the four eastern Indian states is not a new phenomenon; it was very low even in the 1970s.

Certain portion of the total seed used in the country is replaced every year by quality seed through organised supply. The percentage of this replaced portion against total seed use is called Seed Replacement Rate (SRR). The country with higher seed replacement rate will be experiencing higher yield than that of the others.

Table 2: Seed Replacement Rate in Bangladesh and Eastern Indian States[8]

Year	Bangladesh	India			
		Odisha	West Bengal	Bihar	Jharkhand
2001	-	9.59	22.00	6.33	-
2002	-	5.57	23.00	6.87	-
2003	-	6.13	25.00	6.8	-
2004	-	4.73	25.30	10	-
2005	-	6.83	25.50	12	-
2006	24.70	6.4	26	12	-
2007	38.6	12.04	26.5	15	-
2008	39	14.8	28	19	14.25
2009	-	-	-	-	-
2010	47.39	-	-	-	-

- indicates that data is unavailable.

[7] CUTS International, *Dynamics of Rice Seed Trade: Need for Cooperation between India and Bangladesh*, Jaipur, 2013; United States Department of Agriculture, Foreign Agricultural Service, 2012-13; Ministry of Agriculture, Government of India, 2012-13; and Ministry of Agriculture, Government of Bangladesh, 2012-13. Conversion rate for milled to un-milled rice was used as 1kg of un-milled produces 0.6 kg of milled.

[8] Ministry of Agriculture, Government of India; Ministry of Agriculture, Government of Bangladesh; Bangladesh Seed Grower, Dealer and Merchants' Association (BSGDMA) 2007 for 2005/06 and Bangladesh Agricultural Development Corporation (BADC) 2011 for 2007/08.

2.4 *Bangladesh's Hybrid Rice Seeds Trade with India and China*

Bangladesh is a net rice seed importer with an estimated import market size of US$5.9 million in 2010-11. It imports 90 per cent of its total imports of hybrid rice seeds from China, though importing it from India would cost the country far less. However, the country imports fruits, maize and vegetables seeds from India. China meets more than 90 per cent of rice seed orders from Bangladesh. India's exports to Bangladesh remain negligible, accounting for less than 3 per cent of its total exports.

Figure 3: Bangladesh's Hybrid Rice Seed Imports from India and China[9]

Bi-directional informal seed flows between Bangladesh and India are evident. Formal trade can lead to win-win situation for both countries. Bangladesh has around 65 varieties of HYV rice, of these BR11, BRRI Dhan-28 and BRRI Dhan-29 are found to be quite popular in Indian states. Assam Agricultural University has requested BRRI to provide seed of BR-29 as this variety is suitable for cultivation in Assam. Recently, Bangladesh Agricultural Development Corporation (BADC) has exported 40 kg of SL-8H hybrid seed to India which will be cultivated experimentally.

There is also scope for introducing submergence, salt and stress tolerant varieties in both the countries. Indian varieties Miniket, Swarna, Sampa and Parija are found popular in border and other regions of Bangladesh. Although India is a net seed exporting country, Bihar, Odisha, Jharkhand and West Bengal are seed deficit and are characterised by lower level of SRR compared to that of Bangladesh. States like Andhra Pradesh and Maharashtra are major sources of HYV rice seeds to these states.

[9] Trade Map Database, International Trade Centre, 2013, available at www.trademap.org/Index.aspx, accessed on 19 December 2013.

2.5 *Demand and Supply*

Shortage is found in rice seed even after private sector involvement. According to BADC (2011), 39 per cent of demand was met in 2010-11. Of this supply BADC provided 40 per cent, DAE 44 per cent and private sector accounted for 16 per cent. Supply of seed, although lower than required amount, is close to demand in *Boro* season. The deficit is staggering in *Aus* and *Aman* seasons when only 13 and 24 per cent of demand could be met, respectively for 2009-10. The total deficit stood at 180,890 M. Ton in 2009-10.[10]

Import of hybrid seeds by private sector was far less than governments permitted amount in 2010-11 (3,945 tons versus permitted 8530 tons) while private sector production has been growing. Recently, some companies received permission to export more than 500 MT of hybrid rice seeds to Vietnam, Indonesia and Pakistan. BADC has long term strategy regarding rice seed production and supply targeting to provide 62 per cent of rice seed requirement by 2021. Still there is scope for private sector involvement.

Aus constitutes of small amount of rice production while *Boro* makes up overwhelming majority of rice production. Greater access to foundation/certified seed can significantly increase yield and production. By no means is the potential increase in countrywide production small considering the portion of farmers' preserved seed usage.

On the other hand, Bihar, Jharkhand, Odisha and West Bengal had 425,723 quintals of excess certified paddy seed in 2013 *kharif* season. Despite surplus availability of rice seed varieties in the four eastern Indian states, none of the four states are self-sufficient with regard to local production except Bihar. In Jharkhand, Odisha and West Bengal, only 17, 73 and 83 per cent demand is met, respectively. Jharkhand and Odisha have no private sector involvement in rice seed.

HYV and hybrid seeds are the dominant varieties. Hybrid seeds generally entail higher production cost along with higher yield compared with HYV. However, the unit value of cost of seeds import from China is around five times of that from India. It is perceived that bilateral seed trade between Bangladesh and India can create win-win situation for both countries.

Bangladesh does not allow direct import of HYV seeds. There is mechanism for importing parent seed and distributing it through replicating in Bangladesh for enterprises. Bangladesh's current seed market is of US$261 million. While 64 per cent of this belongs to HYV, the rest is hybrid.[11] There is a paucity of data regarding seed import of different varieties and seasons.

[10] Hemant Pullabhotla and A. Ganesh Kumar, "Review of Input and Output Policies for Cereal Production in Bangladesh", *Discussion Paper 01199*, Washington, D. C.: IFPRI, July 2012.
[11] CUTS International, *op. cit*.

2.6 *Policy, Regulations and Regulatory Bodies*

Seed law is the principal legal instrument of seed flow and trade in Bangladesh. The Seed Act 2013 has been drafted and will be enforced in near future to replace the Seeds Ordinance 1977 which has recently been cancelled through a Supreme Court verdict. There is a national seed policy effective from 2003. Seed Certification Agency (SCA) was established through SCA Establishment Gazette, 1974. Seed import is also subject to Plant Quarantine Act, 2010 and Destructive Insects and Pests Act, 1914. Sanitary and Phyto-Sanitary (SPS) measures are used rarely in Bangladesh.

Importing seeds to Bangladesh requires an import permit which is issued by the Plant Protection Wing of the DAE under the Ministry of Agriculture (MoA) and a phyto-sanitary certificate provided by the exporting country is required. Quality certificate from the seed certification authority of the exporting country is also needed. In addition, imported varieties of the five notified crops (rice, wheat, potato, jute and sugarcane) must be listed on the Official National List of Varieties and comply with the crop-specific standards.

National Seed Board (NSB) is the apex body regulating seed flow of Bangladesh. It is a multi-disciplinary body with representatives from government agricultural departments, SCA, seed producers association, seed traders association, finance ministry, academicians and experts. Registration of NSB is mandatory for all types of seed used for commercial purpose in Bangladesh. SCA plays the role of quality assurance, certification and testing. Any seeds, other than those preserved by farmers, have to go through NSB for approval for commercial purpose.

Indian seed sector is regulated by Seeds Act 1966, Seeds (Control) Order 1983, New Policy on Seed Development 1988, Protection of Plant Varieties and Farmer's Right Act 2001, National Seed Policy 2002 and Seeds Bill 2004 (Waiting for Approval). The last two include provision of seed export and import including rice though import of rice seeds remained zero during 2007-2011. It is found that import of seeds will require permit from Plant Protection Advisor to government. Seeds and planting material import will be allowed subject to EXIM policy guidelines and Plants, Fruits and Seeds (Regulation of Import into India) Order 1989. Some of the authorities concerned with seeds are Central Seed Committee (CSC), Central Seed Certification Board (CSCB), Seed Certification Authority of India (SCAI), Central Seed Testing Laboratory (CSTL) and State Seed Testing Laboratories (SSTL). According to proposed Seed Bill 2004, all varieties of seed for sale need to be registered and seed container should be labelled with specific information. It also included provision for farmers' compensation.

3. Informal Rice Seed Trade between Bangladesh and India

The literature on cross-border informal seed trade is meagre. However, formalising this trade on one hand will take agricultural cooperation to the next level

and will ensure quality input at farmer level on the other. Anecdotal evidences suggest that there is informal rice seeds trade occurring at the border points between India and Bangladesh. The main points of such trade are district centres of Jiban Nagar, Jessore district, Benapole, Kushtia, Pragpur, Khulna, Darshana, Rajshahi, Godagiri, Dinajpur, Lalmonirhat, Burimari, Nawabganj, Sonamasjid, and also some other points. Informal traders in a group of 3-10 on an average participate in such trade. Evidences also suggest that the items generally traded by these illicit networks range from rice seed to rice, pulses, etc.[12]

There is presently no data or estimate on the current status of informal rice seeds trade between India and Bangladesh. The study tries to comprehend this scenario in some selected bordering areas of Bangladesh. Such information or estimate is primarily based on implementation of field work during 2013. Indian varieties are primarily cultivated in *Aman* season because of shorter maturity cycle which allows farmers greater option for next crop and unavailability of substitutable varieties. But in *Boro* (irrigated) cost of production is also higher than *Aman*.

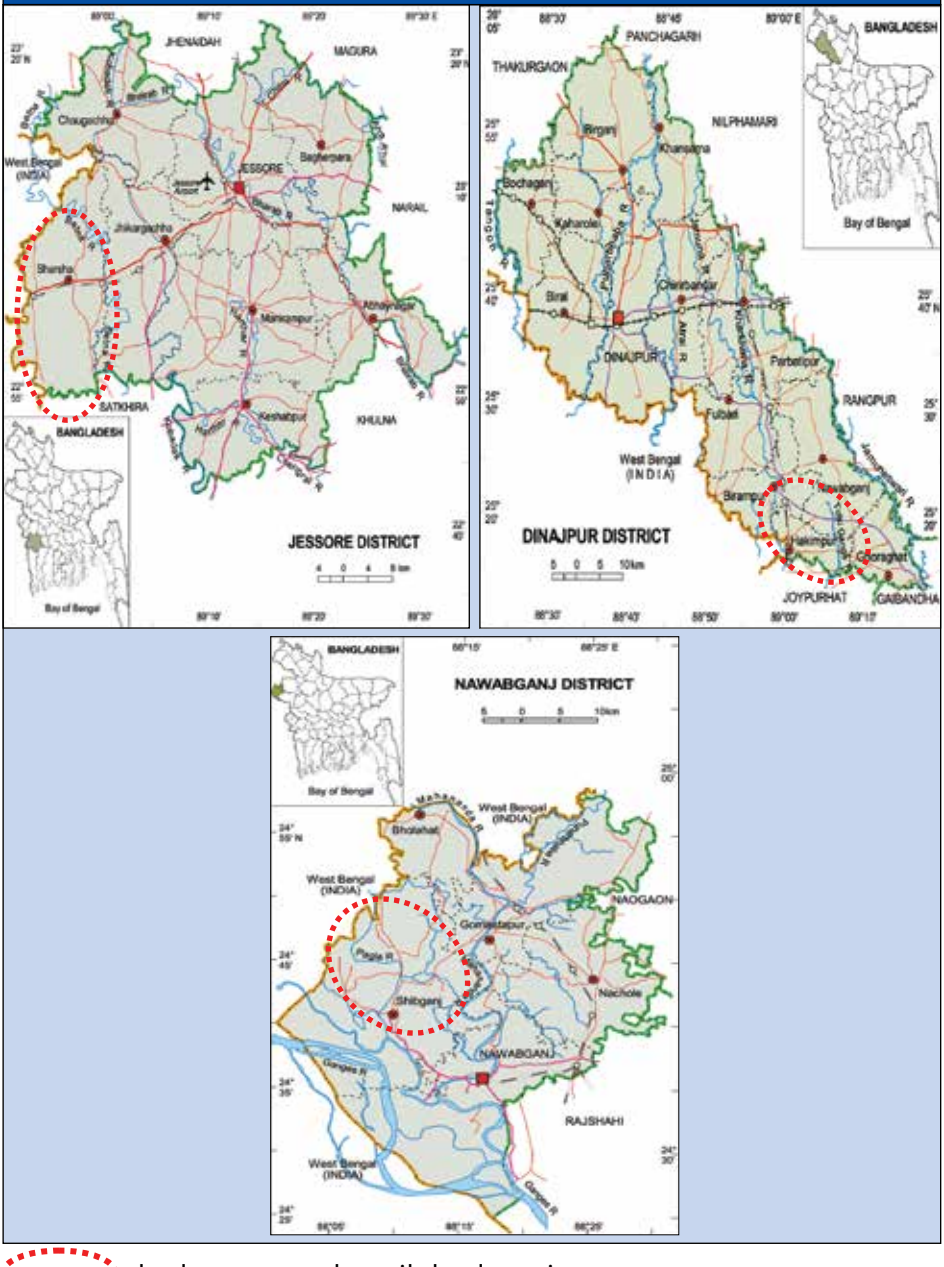
3.1 *Field Findings*

Field visits have been conducted in three bordering districts of Bangladesh which are adjacent to the selected eastern Indian states to understand the rice seeds supply channel in Bangladesh and informal trade with India. Also, stakeholders including seed traders, government officials and researchers have been interviewed. The structure of field investigation has been described below.

- Field visit was conducted at Sonamasjid area of Chapai Nawabganj district. A number of meetings were conducted with important officials and traders, which include the officials of DAE, Upazila Agricultural Officer, Seed Dealer; Sales Promotion Officer of Syngenta (Seed Trading) and journalists. An FGD was conducted with farmers at Chadlai, Ward No. 14, Char Jotpratap of Chapai Nawabganj.

[12] For details, see, S. Pohit and N. Taneja, "India's Informal Trade with Bangladesh: A Qualitative Assessment", *The World Economy*, Vol. 26, No. 8, 2003, pp. 1187-1214; and M. Chakraborty, "Indo-Bangladesh Informal Trade Nexus: India's Security Predicament", *Asia Pacific Journal of Social Sciences*, Vol. 1, No. 1, 2009, pp. 19-34.

Map: Areas of Field Investigation



= land port area and upazila level meetings

- Field visit to Hili land port (Hakimpur upazila), Dinajpur. The study team had discussion with local journalists, seed dealers, farmers, government officials from DAE, BADC and plant quarantine office at district and upazila level.

- The project team visited Benapole land port (Sharsha upazila) area in Jessore district in order to get better understanding of informal rice seed trade dynamics from 21-24 September 2013. Meetings were held with seed dealers, traders, producers, government officials, and plant quarantine office at district and upazila level. Also, the team conducted FGD with local farmers.

- Several one to one meetings were held in Dhaka with policymakers, businessmen, civil society leaders to validate the field findings and gather additional information.

- The major field findings have been summarised in Table 3. It reveals that informal trade is in general not frequently occurring across Bangladesh.

Table 3: Major Findings from the Field[13]

	Jessore	Dinajpur	Chapai Nawabganj
Informal rice seeds trade varieties	Swarna (Lal Swarna, Guti, Miniket (Zira Miniket)	Swarna, Swampa, Parija, Mamun	Swarna (Guti and Sada), Parija, Somsor
Certified seeds of Indian HYV	Certified seed of 30kg bag are available	Certified seeds are unavailable but farmers produce locally	Certified seeds are not available but farmers produce locally
Germination problem of Indian HYV	Germination problem is not found	Germination problem for Indian HYV is lower than that of local HYV	Parija variety has germination problem
Production per bigha	20/22 mounds	18/20 mounds	18/20 mounds
Informal trade frequency	Frequent informal trade across borders	Occasional trade between borders and farmers produce locally after taking from Indian neighbour	Informal trade is not regularly occurring
Trend of hybrid rice production	Hybrid seed is exhibiting decreasing trend	Use of hybrid seeds is falling	Use of hybrid seeds is falling
Last five years production of Indian HYV	Swarna, Miniket	Swarna, Swampa	Swarna, Parija
Functionality of quarantine office	Quarantine office is fully functional	Quarantine office is fully functional	Not visited
Seeds generation	Farmers are concerned about seeds generation	Farmers are not concerned about seeds generation	Generation related information on seed is not available in case of farmers preserved seed

[13] Based on field survey during July to September 2013.

- From extensive field research, it is observed that at Chapai Nawabganj in *Aman* season, out of 48,000 hectare land, Swarna was cultivated in 33,000 hectare land. Farmers meet most of their seed demand from their preserved seed. BADC sells seed at 10 kg package while private companies sell seed at 1, 5 and 10 kg packages. It costs Tk. 360 in 10 kg from BADC and around Tk. 200-250 of 10 kg package from private companies.

- Informal trade is not occurring regularly in Chapai Nawabganj and Lalmonirhat districts. Based on relationship, some farmers received seeds of Indian varieties through their relatives or other farmers living on other side of the border. These seeds were further replicated by farmers of Bangladesh. Rice seeds of Indian variety are produced locally. Same applies to seed flow from Bangladesh to India.

- Miniket and Swarna seeds are coming informally in Bangladesh at Benapole area of Jessore district with 30 kg package. These are certified seeds from Indian authority, which is sold in the informal market at Tk. 60 per kg.

- Farmers prefer not to buy seeds from any source but use own preserved seeds. Buying seeds from external sources poses uncertainty regarding availability and price. Farmers argued that it is preferable to use own preserved seeds albeit of lower yield than facing uncertainty.

- Discussion with seed dealers revealed that 7-8 years back farmers used their preserved seeds only. After long advocacy farmers are now gradually buying seeds from dealers, but still in very low amount.

- Currently, hybrid seeds are imported, but not HYV seeds. However, hybrid seeds are showing a declining trend. Generation related information on seed is not available in case of farmers' preserved seed. This is particularly true for informally traded Indian varieties. Usage of certified seed can significantly increase production of rice.

- Field visit in Dinajpur revealed the fact that in *Aman* season, 53 per cent is Swarna among the cultivated varieties. At Hakimpur upazila of Dinajpur, total area under rice production is 7,196 hectare in *Boro* season. Of this area 5,646 hectare is under HYV of 3 Indian and 4 Bangladeshi varieties. 1,550 hectare is under hybrid which was previously much greater. BRRI-28, BRRI-29, Miniket and BR-49 are responsible for 17, 23, 14 and 12 per cent, respectively.

- Nine Indian varieties are farmed in about 5,390 hectare out of 8,170 hectare in *Aman* season. Guti Swarna, Mamun, BRRI Dhan-34, Swarna-5

and Ranjit contributed 20, 17, 16, 15 and 5 per cent respectively to total *Aman* production.

- Seed dealers are found to have been sold unpackaged seed collected from farmers and from Joypurhat district because of high demand. There is scope for selling certified Indian popular varieties due to high demand.

- Yields of Indian varieties are decreasing as certified seed is not available and quality of seeds preserved by farmers deteriorates after 4-5 seasons.

- Discussion with farmers revealed that they are eager to buy quality input and adapt to modern production techniques.

Table 4: Cultivation of Indian and Local HYV[14]

Season	Local HYV	%	Indian HYV	%
Chapai Nawabganj				
Aman	BRRI Dhan-34	1	Swarna	87.37
	BR-11	1		
Boro	BR-28	25.79	Parija	35.97
	BR-29	14.22	Somsu	3.53
Jessore				
Aman	Bina-7	11.46	Swarna (Guti, Kolamocha, Bulet)	33.53
	BR-39	12.84		
Boro	BRRI Dhan-50	24	Miniket	27.90
	BRRI Dhan-28	21.23		
	BR-26	24.73		
Aus	BR-28	14.48	Miniket	28.30
Dinajpur				
Aman	BRRI Dhan-34	13.8	Swarna	53
	BRRI Dhan-50	20		
	BRRI Dhan-11	2		
Boro	BR-28	33		
	BR-29	27.5		

Indian varieties are dominant in the region. After getting expected amount of production, farmers preserve it for their next cultivation time. In the Jessore border area, the team found that foundation seeds and certified bags of rice seeds are smuggled from India and cultivated for production. Farmers informed the study team that they have no faith on the publicly supplied seeds as adulterations are common phenomena.

[14] Department of Agricultural Extension (DAE), District Offices, Ministry of Agriculture, Bangladesh.

There is scope for importing *Aman* and *Aus* varieties from India to Bangladesh and *Boro* varieties from Bangladesh to India. Strong political commitment is required in agricultural cooperation between the two countries so that there are long-term, sustainable solutions to food security challenges faced by both.

4. Barriers of Rice Seed Trade

Analysis of current policies shows that nothing can deter import of rice seed and its replication in Bangladesh for commercial purposes. The registration process is standard for all countries and applicable even for public companies. It can be assumed that generalised trade barriers and trade facilitation recommendations for Bangladesh-India are applicable for rice seed trade also. Bangladesh imports fruit, maize and vegetables seed from India, and does not impose any customs or import duty on seeds.

The regulatory framework partly explains why there exists informal seed trade between Bangladesh and India. Farmers, through their networks, might be interested in a particular variety from other side of border. In absence of institutional framework required for supply of seed and easy availability or widespread smuggling can make these seeds available. Therefore, informal trade takes place between the two countries. India also places regulations and policies that regulate rice seed import. It is neither possible nor efficient for a small, medium or large farmer to complete the processes required for importing seed legally.

One aspect of the policy framework is that policies treat all kinds of seed universally in terms of approval. All notified crop seed like rice has to undergo two seasons of field testing whether it is certified by country of origin, international bodies or not certified at all. This provision, while safeguards farmers' interest, also makes the registration process quite lengthy. Enabling Agricultural Trade (EAT), a project funded by USAID, found that it takes 860 days to register a proprietary staple grain variety through five procedures.[15]

4.1 *Opinion of Experts and Stakeholders*

Trading barriers are more rigid and greater in number from Indian side. Bangladesh imports a wide array of products from India through formal and informal process. From Bangladesh side there are minimal trade barriers. But in case of India, due to their federal government system, facilitating trade requires much longer time and many forms of documents, authorisation and certification from a number of bodies.

[15] USAID, *Agribusiness Regulation and Institutions (Agri) Index Pilot Report, Enabling Agricultural Trade*, Dhaka, 2012.

An exercise trying to export some quantity of seed from Bangladesh to India would reveal all the trade barriers pertaining in this sector. They emphasised repeatedly on this exercise as it would be very effective and helpful for this study. NSB is aware of the informal rice seed trade between the two countries. There was also discussion of the issue in a meeting of NSB. However, no consensus was reached despite some members' interests to formalise this type of trade. Formal trade is expected to bridge the demand supply gaps. More seeds will be available to farmers and quality production of rice will take place because farmers will be able to use the certified seeds and foundation seeds. Tariff and non-tariff barriers, customs duties and transportation cost will be issues of concern if trade is formalised.

There are government level initiatives to bring out bilateral and multilateral cooperation between Bangladesh and India and other SAARC countries in rice seeds trade. SAARC Seed Bank Agreement for multilateral seed trade facilitation was signed in 2009 and Bangladesh government is trying to accelerate the speed of seed trade among the SAARC nations for ensuring the quality production of rice in the South Asian region. One of the most fundamental barriers is the rice seed standards of the two countries. They are trying to accelerate the speed of cooperation for harmonising the standards of the two countries. Formal trade of HYV seeds is very important because certified HYV rice seeds of India and Bangladesh will be helpful for quality production of rice for these countries.

To meet the shortage and to cease the informal trade of rice seeds between Bangladesh and India, the following measures are needed:

- Enhanced bilateral cooperation
- Harmonisation of policy standards
- Eliminating the discrepancy of the system and procedure of the Quarantine Office of the concerned countries
- Eliminating Indian non-tariff barriers to seed import

4.2 *Non-Tariff and Para-Tariff Barriers*

Some barriers that are currently affecting the flow of Bangladesh's exports to India include

- Classification
- Laboratory testing and chemical testing
- Labelling requirements
- Registration

- Quarantine requirements
- Sanitary and Phyto-Sanitary (SPS) requirements

For primary agricultural products, India requires bio-security, SPS and import permits, which Bangladeshi exporters consider complex. While importing all kinds of 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 and results in undesirable demurrage.

Export to India would not increase much unless the non-tariff and para-tariff barriers are removed. Both Bangladesh and India would obtain greater and more secure economic benefits by giving priority to unilateral trade liberalisation on a multilateral basis, rather than by pursuing free trade arrangements. It does not mean that other trade-related cooperative endeavours should be neglected. In particular there would be substantial benefits from coordinated improvements in transport, storage and administrative infrastructures at and adjoining the Bangladesh-India land borders, as well as in harmonisation and cooperation in customs administration and banking relationships. Bilateral trade facilitation and its cost reduction would help reduce black economy activities in both countries associated with both the "bootleg" and "technical" smuggling routes, and improve fiscal resources, especially in Bangladesh.

4.3 *Seed and Field Standards of Paddy*

Table 5: Standard Requirements for Bangladesh[16]

	Factors	Seed Standard		
		Breeder	**Foundation**	**Certified/TLS**
(A) Seed Standard				
1	Pure seed (minimum per cent by wt.)	99.00	97.00	96.00
2	Inert matter (max. per cent by wt.)	1.00	2.00	3.00
3	Other seed (maximum per cent by wt.)	Trace	1.00	1.00
	a. Other crop seed (maximum no. in total; whole sample will be tested)	2/kg	5/kg	10/kg
	b. Total weed seed (max. no. in total; whole sample will be tested)	2/kg	8/kg	10/kg
4	Germination (minimum per cent)	80.00	80.0	80.0
5	Moisture content (maximum per cent)	12.00	12.00	12.00
(B) Field Standard				
1	Isolation distance (in metre)	3.00	3.00	3.00
2	Other crop plants (maximum per cent by no.)	0.00	0.10	0.20

[16] Ministry of Agriculture, Government of Bangladesh.

3	Other varieties (maximum per cent by no.)	0.00	0.10	0.50
4	Weed plants (obnoxious max. per cent by no.) a. Wild rice/red rice b. Barnyard glass	0.0	0.03	0.05
5	Plants infected by seed borne disease (max. per cent of infected plants)	5.00	10.00	20.00

General condition of crop: If the field crop is severely damaged or lodged and irregularly flowered that makes crop assessment difficult to judge the trueness of variety and varietal purity, it will be rejected.

For India

Application and Amplification of General Seed Certification Standards

The General Seed Certification Standards are basic and, together with the following specific standards, constitute the standards for certification of paddy seed.

- Land to be used for seed production of paddy shall be free of volunteer plants.
- A minimum of two inspections shall be made from the time the crop approaches flowering until it is ready for harvesting.
- Field standards include general requirements and isolation.

Paddy seed fields shall be isolated from the contaminants shown in column 1 of the Table below by the distances specified in columns 2 and 3:

Table 6: Specific Requirements[17]

Contaminants	Minimum distance (metres)	
	Foundation	Certified
Fields of other varieties	3	3
Fields of the same variety not conforming to varietal purity requirements for certification	3	3

Factors	Maximum permitted (per cent)*	
	Foundation	Certified
Off-types	0.050	0.20
Objectionable weed plants	0.010	0.020
Standards for off-types and objectionable weeds shall be met at the final inspection. Objectionable weed shall be: Wild rice		

[17] Ministry of Agriculture, Government of India.

Seed Standards

There are some significant differences in standard of paddy seeds between two countries. Harmonisation of the standards will create the opportunities for importing and exporting of HYV seeds between two countries.

Table 7: Seed Standards[18]

Factor	Standards for each class	
	Foundation	Certified
Pure seed (minimum)	98.0 per cent	98.0 per cent
Inert matter (maximum)	2.0 per cent	2.0 per cent
Huskless seeds (maximum)	2.0 per cent	2.0 per cent
Other crop seeds (maximum)	10/kg	20/kg
Other distinguishable varieties (maximum)	10/kg	20/kg
Total weed seeds (maximum)	10/kg	20/kg
*Objectionable weed seeds (maximum)	2/kg	5/kg
Seeds infected by paddy bunt (*Neovossiahorrida* (Tak.) Padwick & Azmatulla Khan (maximum)	0.10 per cent (by number)	0.50 per cent (by number)
Germination (minimum)	80 per cent	80 per cent
Moisture (maximum)	13.0 per cent	13.0 per cent
For vapour-proof containers (maximum)	8.0 per cent	8.0 per cent

*Objectionable weed is the same as shown in Table 6.

Time Schedule for Clearance

A minimum of 8-10 days or more is required in exports for certification of seed consignments. Conversely, perishable commodities such as nursery plants, tissue cultures, fresh fruits, cut flowers, etc. are certified within a maximum period of 24-48 hours and consignments that require fumigation are certified within 3 days.

The period of quarantine clearance for seeds imports is 30-35 days and perishable plant materials such as cuttings/saplings/bud wood, etc. are cleared within 12-24 hours. However, plant materials for consumption are cleared within a day or two except those requiring fumigation after 3 days. The tissue cultures and mushroom spawn cultures as well as cut flowers and fresh fruits are cleared within 4-6 hours.

5. Conclusion and Way Forward

This paper tries to explore farmers' perspectives, seed marketing feasibilities, supply chain and rice seed entrepreneurship opportunities to look for loopholes in trade barriers and seed sectors, *e.g.*, policy initiatives, seed production system, the role of public and private sectors, variety registration procedure, varietal protection

[18] Ministry of Agriculture, Government of Bangladesh.

and the likes. It would also allow analysing issues of non-tariff and para-tariff barriers that hinder Bangladesh-India rice seed trade. This includes delving into spaces where tariff barriers and standard testing risk being the biggest impediments in the growth of bilateral trade between the two countries. The paper tried to identify such trade barriers and attempt to formulate solutions towards a "win-win-situation" on HYV rice seed trade ties with the neighbouring country. This would subsequently help achieve food security and economic advancement.

Given this backdrop, there is a clear need for improving availability and accessibility to modern variety of rice seeds in both Bangladesh and India. As both the countries experience resource and technical constraints, cooperation is probably the best way out. Some of the avenues to enhance bilateral cooperation between Bangladesh and India rice seed trade can be to harmonise standards, certification process and quarantine laws; develop regional/bilateral seed bank; establish joint body for research and development in agriculture; allow seed trade in *Border Haat* and share genes of existing varieties at government level so that each country can release the varieties of the other.

i ***Trade Formalisation***

To formalise this type of trade there is scope for private sector involvement. Private enterprises by following the present regulation of going through NSB can make seeds available to domestic market. If prices and packaging are kept at competitive level then trade could be formalised.

ii ***SAARC Seed Bank and Scope for Bilateral Cooperation***

To form collective self-reliance in agriculture with respect to attaining seed security and also contributing to harmonised seed testing, certification and seed trade, the main objectives of the SAARC Seed Bank are:

- Provide regional support to national seed security efforts
- Strengthen cooperation in increasing Seed Replacement Rate (SRR)
- Act as a regional seed security reserve
- Strengthen the role of farmers/farming communities and protection of their rights
- Provide farmers with quality seeds in the SAARC region

In view of the similar agro-climatic conditions and commonalities in terms of agricultural practices, requirements and associated problems in the region, there are substantial opportunities to extend cooperation for development and

maintenance of harmonised seed system of the SAARC countries. This could help in making available seeds of improved varieties of such crops suitable for every agro-climatic zone/condition, which is released by any country in the region.[19] This may be particularly useful in meeting the seed shortages caused by natural calamities. Regional cooperation is no doubt a prime need to develop seed sector in terms of quality seed production, varietal exchange, seed trade and to mitigate different crisis in agricultural sector.[20] There is also scope for exchanging varieties at government level to formalise the unregistered seed variety cultivation occurring in Bangladesh and India so that farmers are ensured with quality input.

iii ***Research and Release of New Varieties Regionally***

The HYV seeds can be introduced/released through international research institutes in different countries. If IRRI introduces the HYV varieties for Bangladesh and India with different names as Swarna Sub-1 in India and BRRI Dhan-51 in Bangladesh, the poor farmers will be benefitted and more quality seeds will be available which are required for high yield. Although in Bangladesh private sector produces foundation seed of HYV varieties the varietal development is primarily focused on hybrid, while public sector is generally responsible for developing HYV varieties. In this case, joint research by Bangladesh and India can ensure sufficient investment in sustainable development of HYV varieties.

iv ***Harmonisation of Standards, Certification and Registration Procedures***

The initiatives to harmonise standards, certification and registration process need to be accelerated to promote greater private sector participation and enhanced regional cooperation.

v ***Increasing Quality Seed Usage at Farmer Level***

The gap between demand and supply of seed is met primarily through farmers-preserved seeds. Usage of foundation and certified seed can significantly increase production. Due to unavailability of seeds, uncertainty regarding price, availability and quality of seeds, farmers have relied on preserved seed after harvest. At present availability, quality and uncertainty aspects are improved and farmers are gradually buying seeds. Still preserved seed dominates seed usage. Ensuring quality seed usage at farmer level is therefore another useful point of intervention.[21]

[19] Seed Wing, *SAARC Seed Congress Fair 2011*, Ministry of Agriculture, Bangladesh and Bangladesh Seed Association, SAARC Agriculture Centre, Dhaka.
[20] M. K. Bashar, A. Salahuddin and P. van Mele, "Building a Rice Seed Network", in P. van Mele, A. Salahuddin and N. P. Magor (eds.), *Innovations in Rural Extension: Case Studies from Bangladesh*, Wallingford: CABI Publishing, 2005.
[21] M. Kabir, S. P. Singh and A. R. Khan, "Rice Seed Production and Use in Bangladesh and India: Need for Bilateral Cooperation", *Souvenir of AGM of Bangladesh Seed Association Meeting*, 27 September 2013, Dhaka.

vi *Cooperation in Modern Variety (MV) Rice Seed*

Having a similar agro-climatic conditions and food habits, technical knowledge and infrastructure available in the two countries can be mutually used for improving food security scenario. For greater collaboration and cooperation in MV rice seed, the following measures should be adopted by the governments of Bangladesh and India:

- Given the sensitivity of MV rice seeds, there should be attempts in both countries to gather, estimate informal flow of rice seeds to understand demand for Bangladeshi/Indian varieties in each other.

- Seed policies of Bangladesh and India do not put any restriction on import/export of MV rice seeds. It needs to be explored why trade in MV rice seed does not exist despite seeds of other crops being traded.

- There is need for rice research institutions in the two countries to cooperate and collaborate in development of MV rice seeds and its use.

- Considering that demand for MV rice seed is more than supply in both the countries, governments should encourage and facilitate active participation of private sector in seed development. Given the low level of awareness with regard to MV rice seed, both the governments should launch campaign to encourage greater acceptability of MV rice seeds.