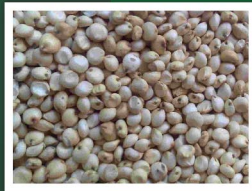


Potential for Trade in Seeds between India and Other SAARC Countries



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Published by



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Jaipur 302016, India
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Web site: www.cuts-international.org

With the support of



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First published: December 2013

This document has been produced with the financial assistance of the Bill and Melinda Gates Foundation under a project entitled “Addressing Barriers to Rice Seeds Trade Between India and Bangladesh (RISTE)”. The views expressed here are those of the author and can therefore in no way be taken to reflect the positions of the Bill and Melinda Gates Foundation.

ISBN: 978-81-8257-204-1

Printed in India by Jaipur Printers Private Limited, Jaipur

#1331

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Abbreviations

BTI	:	Bilateral Trade Intensity
CAGR	:	Compound Annual Growth Rate
FDI	:	Foreign Direct Investment
GDP	:	Gross Domestic Product
HYV	:	High Yielding Varieties
ICAR	:	Indian Council of Agricultural Research
MFN	:	Most Favoured Nation
NSAI	:	National Seed Associations of India
NSC	:	National Seeds Corporation
RCA	:	Revealed Comparative Advantage
SAARC	:	South Asian Association for Regional Cooperation
SAFTA	:	South Asian Free Trade Area
SAUs	:	State Agricultural Universities
SFCI	:	State Farm Corporation of India
SSCs	:	State Seed Corporations
SSTLs	:	State Seed Testing Laboratories
VAT	:	Value Added Tax

Preface

Because of their proximity, India and other South Asian countries offer natural markets for each other's commodities. The South Asia region enjoys mutual advantages of similar agro-climatic conditions, food habits and common languages. Also, it has several advantages such as potentially low transaction cost, complementarity in production process. This is evident from significant informal trade in agricultural commodities. At the same time, formal intra-regional trade in agriculture and related commodities is very low.

Therefore, these similarities and advantages are worthwhile to explore so that there can be better opportunities for increasing formal trade in agricultural inputs such as seeds as well as outputs to meet an increasing demand.

While food is a critical basic need, seed is a critical input for sustenance and improvement in agricultural production. For better food security in South Asia, which is home to a disproportionately large number of people suffering from poverty, hunger and malnutrition, adequate availability and accessibility to quality seeds play a significant role in addressing this basic need.

However, all countries in the region are not adequately sufficient in the production and distribution of quality seeds. While some countries are better placed in the production of a few varieties of quality seeds, they are disadvantageous in the production of other varieties. Such drawbacks at the country level call for increased cooperation amongst these geographically contiguous countries. This is especially important because good quality seeds are one of the most important inputs to increase yields, which are, on an average, significantly low in South Asia as compared to other countries of Asia.

Thus, this study is an attempt to analyse and understand how different countries in the region are placed vis-à-vis others with respect to the production and trade potentiality of seeds used for producing commodities directly or indirectly related to food security and other livelihood concerns

faced by the region. They include rice, wheat, vegetables, fruits, oilseeds, maize, barley, sorghum and buckwheat.

It analyses the existing opportunity of trade in seeds from India to other SAARC countries. In respect to those seeds, it has computed bilateral trade intensity index and revealed comparative advantage index for all countries of region.

This paper is written under a project titled 'Addressing Barriers to Rice Seeds Trade between India and Bangladesh' (RISTE project), which is supported by the Bill & Melinda Gates Foundation. I thank the Gates Foundation for its support and my colleagues, Nitesh Kumar Singh for writing this paper under the guidance of Suresh Prasad Singh, Policy Analyst, CUTS International and Sushil Pandey, former Senior Scientist, International Rice Research Institute, Manila, The Philippines and Adviser to the CUTS RISTE project.

Being a reputed think-tank addressing a large number of issues, among others, in a sustained and dynamic manner for the betterment of intra-regional trade in South Asia through research-based policy advocacy and networking among like-minded groups, we will take forward the results of this study to the relevant policy-making community in South Asian countries and to regional bodies, such as the Secretariat of the South Asian Association for Regional Cooperation, South Asian Regional Standards Organisation.

Jaipur, India
December 2013

Bipul Chatterjee
Deputy Executive Director

Executive Summary

India and other South Asian Association for Regional Cooperation (SAARC) countries offer natural markets for each other's export products. The South Asia region enjoys mutual advantages of trade carried out within the group due to low transaction cost, scope for quicker delivery, similar agro-climatic conditions and food habits and common languages. These similarities are worthwhile to explore opportunities for increasing formal trade to meet demand, especially in food items.

This paper explores potential for trade in seeds. It identifies nine important seeds that are directly or indirectly related to food security and livelihood in the region. These include vegetables, fruits, oil, maize, wheat, rice, barley, grain sorghum and buckwheat.

The paper shows that though total trade (in nine identified seeds) between India and the other SAARC countries reveals an increasing trend during the period 2001-11, the region holds much bigger potential and opportunity of seed trade. Among the South Asian countries, India holds a place of prominence in seed trade, particularly export. The paper reveals that India is a dominant player in the SAARC seed market, whose status can be understood by the fact that India's total seed export to SAARC countries constitutes over 93 percent of its total seed trade.

Overall, India's export of seeds to other SAARC countries constituted 1.87 percent of its total seed export to the world valued at US\$165mn in 2001. A significant change, however, is observed over the next 10-year period – the share of South Asian countries jumped to over seven percent in India's total seed export valued at US\$713mn in 2011.

It is also revealed that total seed export from India to other SAARC countries increased at a much faster rate (CAGR 33 percent) compared to that of its seed exports to the world (CAGR 15 percent). In contrast, India's seed import from other SAARC countries which constituted 1.12 percent of the total import of US\$17mn in 2001 declined to 0.47 percent during the period 2001-11.

To analyse the existing opportunity of seed trade from India to other SAARC countries, Bilateral Trade Intensity Index and Revealed Comparative Advantage (RCA) Index has been computed. The bilateral trade intensity index of seed trade shows that SAARC countries particularly Nepal, Bangladesh and Pakistan have emerged as good markets for India in last one-decade period.

The paper also computed comparative advantage and disadvantage in seed trade with revealed comparative method between India and other SAARC countries. India has comparative advantage in export of eight seeds i.e., vegetable, fruit, oil, wheat, maize, grain sorghum, barley and rice seed to other SAARC countries while it has disadvantage in exporting of buckwheat seed to other SAARC countries.

1

Introduction

SAARC¹ member-countries are predominantly agriculture-based economies. All the SAARC countries derive their sustainability in economic growth and development from agriculture to a large extent. SAARC, as per its mandate, seeks to facilitate cooperation and collaboration between its member-countries in 11 areas. These include agriculture, education, culture and sports; health, population and child welfare; the environment and meteorology; rural development; tourism; transport; science and technology; and communications.

Any decline or stagnancy in agriculture growth not only impacts growth in gross domestic product (GDP), but also reduces per capita income and thus increases poverty and food insecurity. Though it is observed that the contribution of the agriculture sector in GDP for all SAARC countries in the last decade has declined² except for Nepal and the contribution of service and manufacturing sector has increased, this in no way negates importance of agriculture for these countries. This is because agriculture is not only a contributor to GDP but it also provides employment and livelihood to millions of people in the region.

Another feature of the SAARC countries is that agriculture yield and production is found to be low as compared to the other developing and developed countries. At present, this region faces huge challenges on account of climate change, global warming and higher prices of food grains.

All these challenges coupled with lack of adequate irrigation facilities and declining agricultural productivity lead to the reduction in agriculture production which implies low level of food availability. It also results in increased volatility in the food market. Besides, the region is popularly known for its low income and middle low-income status in the world.

It is accepted that India and other SAARC countries potentially offer natural markets for each other's export products. Close proximity could result in low transaction costs. Other factors that create advantageous

position include scope for quicker delivery, similar agro-climatic conditions and food habits and common languages. In reality, however, the situation is not very conducive. It is observed that the region suffers from high trade cost because of various factors. These primarily include infrastructure bottlenecks and also non-trade-related issues.

To address the issue of lack of cooperation, continuous efforts from the government of South Asian countries culminated in establishment of the South Asian Free Trade Area (SAFTA) agreement in January 2004 (at the 12th SAARC summit in Pakistan). The agreement virtually created a free trade area of 1.8 billion people.

Under the agreement, it was agreed to reduce customs duties of all traded goods to zero by the year 2016. The SAFTA agreement came into force on 1 January 2006 and is operational following the ratification of the agreement by the member-countries.

As far as real development and cooperation between the SAARC member-countries is concerned, not much has changed despite establishment of SAARC and SAFTA. The region continues to remain one of the least integrated regions globally with less than 10 percent of total trade of the member-countries occurring within the group. This is obviously not because of lack of complementarity or lack of potential. Agriculture, including agricultural inputs, suffers from the same fate, despite looming threats to food security and climate change in the region.

Many Indian states share a border with some of the countries of the SAARC countries like Bihar with Nepal, West Bengal with Bangladesh, and Jammu and Kashmir and Rajasthan with Pakistan, indicating potential to significantly enhance the level of people-to-people contact within the region.

Needless to say, seed is the basic input in the enhancement of agricultural production and productivity of different crops. The green revolution in India and other South Asian countries during the 1960s and 1970s is clear evidence of this. Particularly in food grain production, India and other South Asian countries got a tremendous boost.

The major achievement in wheat and also rice production was due to adoption of high-yielding varieties (HYV) of seeds by the farmers. In India, a similar development occurred during 2000s, when Bt cotton and hybrid maize seed showed spectacular results in the production of both the crops.

The paper seeks to explore and understand the scope and potential for trade in agricultural seeds within the region with a focus on India. The selection of seeds as the focus for the paper stems from the fact that seed

is one of the most important determinants of crop yields and thus food security in the region. The paper identifies nine important agricultural products (seeds) that are directly or indirectly related to food security and livelihood in the region. These include vegetable, fruit, oil, maize, wheat, rice, barley, grain sorghum and buckwheat seeds.

This paper consists of five sections. Section two deals India's trade in seed and seed scenarios in India. Section three deals with India's trade in seed in SAARC countries. Section four presents the results and findings. Section five provides the conclusion.

2

India's Production and Trade in Seeds

Seed-related Initiatives

India constitutes the fifth largest seed market measured in value terms in the world.³ The share of Indian seed industry in the global seed production is 4.7 percent preceded by the US (28.1 percent), China (21.2 percent), France (8.4 percent), and Brazil (6.2 percent). In terms of overall demand-supply scenario, the Indian seed industry appears to be self-sufficient in a number of seeds categories such as flower, fruits, vegetables and field crop. The future scenario also portends well.

According to an estimate done by the National Seed Associations of India (NSAI), the seed industry will grow at an average of about 11 percent till 2016. The growth would be primarily because of increase in demand and the need for increasing supplies of grain in the world. It is expected that grain productivity would gradually decline in many regions owing to low seed replacement rates and other factors. Such a scenario would call for initiatives to improve the seed replacement rate.

In addition, Indian seed policies and regulations are seemingly in favour of seed producer and exporter, and that might help the sector to grow in coming years. The industry is exempted from income tax, excise duty and value added tax (VAT). Besides, considering the importance of the sector, the government of India has allowed 100 percent foreign direct investment (FDI) in the development and production of seeds and planting materials.

Institutional Set-up and Trend in Seed Acreage

In India, it is noted that the supply of breeder seed⁴ by Indian Council of Agricultural Research (ICAR) and state agricultural universities (SAUs) are available in sufficient quantity to meet the domestic demand of all

breeder seed. There are, however, some issues with regard to multiplication of breeder seed to foundation and certified seed.

It is often argued that the full potential is not realised. This might be due to inadequate follow-up of recommended policy on seed multiplication, leading to low seed replacement rate in the country. The SAARC report on seed (2009) shows that only 25 percent certified seed are distributed by the organised sector and rest of the remaining seed comes from the farmer-saved seed/unorganised sector.

Despite some issues encountered, the seed sector in India has shown impressive progress over the last few decades. The area under certified seeds for all crops has increased from less than 500 hectares in 1962-63 to over 5 lakh hectares in 1999-2000. Even in the later years, impressive developments have occurred with regard to requirement⁵ and availability of quality seeds. The requirement and availability of certified/quality seed which was 110.83 and 132.27 lakh quintals in 2004-05 increased to 207.25 and 250.35 lakh quintals in 2008-09. In the four-year period, the increase in requirement and availability was by a whopping 1.87 and 1.89 times.

Structure of Seed Industry

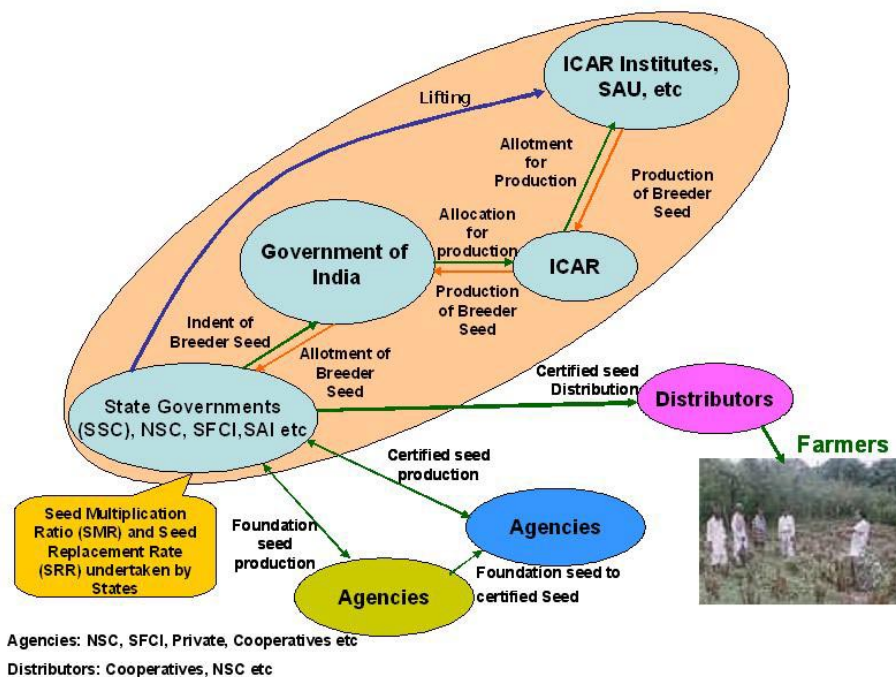
The Indian seed system is run by the Central and State governments, ICAR, SAUs, the public sector, co-operative sector and private sector institutions. The seed sector in India consists of two national-level corporations, i.e. National Seeds Corporation (NSC) and State Farm Corporation of India (SFCI), 13 State Seed Corporations (SSCs) and about 100 major private sector seed companies (Figure 1).

For quality control and certification, there are 20 State Seed Certification Agencies (SSCAs) and 100 State Seed Testing Laboratories (SSTLs). It is observed that over the last few years since the introduction of the New Seed Policy of 1988, the private sector has started to play a significant role in the production and distribution of seeds, particularly for food crops and cereals, a function earlier dominated by the public sector.

Trend in Seed Production

Table 1 shows that overall production of breeder and foundation seed and distribution of all inclusive certified seed in India from 2000-01 and 2010-11. The production of breeder and foundation seed during this period has increased three times. The compound annual growth rate (CAGR)

Figure 1: Mapping of Indian Seed Industry (Seed Supply Chain in India)



Source: http://seednet.gov.in/Material/Channels_of_Seed_Supply.htm

for the production of breeder and foundation seeds works out to 12.08 percent and 12.84 percent respectively for the 10 year period covering 2000-01 to 2010-11. Production of certified seeds over the same periods has increased by over three times, registering a CAGR of 13.85 percent.

It is observed that the production of seed in India is concentrated in a few states. For example, more than 90 percent of hybrid rice seed is produced in Andhra Pradesh. The major seed-producing states include Andhra Pradesh, Tamil Nadu, Haryana, Maharashtra, Odisha, West Bengal and Chhattisgarh.

In all the major seed-producing states, the private sector has emerged as a major player. As indicated in the table, the contribution of private sector in seed supply is recorded highest in the Andhra Pradesh (20.91) followed by Madhya Pradesh (13.77), Tamil Nadu (10.75) in 2009-10 while in 2011-12, private sector supply is highest in Uttar Pradesh (27.89), followed by Andhra Pradesh (22.19), West Bengal (16.36), Maharashtra (15.76), Punjab (15.3) and Madhya Pradesh (14.21). Table 2 (page 9) shows the total demand-supply and supply by the private sector of certified/quality seed in Indian major agriculture-producing states.

Table 1: Production of Breeder, Foundation and Certified Seed in India			
Year	Production of Breeder Seed (In thousand qtl)	Production of Foundation Seed (In lakh qtl)	Distribution of Certified/Quality Seed (In lakh qtl)
2000-01	42.69	5.91	86.27
2001-02	45.54	5.44	91.8
2002-03	48.42	6.14	98.03
2003-04	61.82	6.5	108.59
2004-05	66.46	6.9	120.26
2005-06	68.64	7.4	126.75
2006-07	73.83	7.96	155.01
2007-08	91.96	8.22	179.05
2008-09	94.41	9.69	215.81
2009-10	105	10.5	257.11
2010-11	119.21	17.53	277.34
<i>Source: Indiastat.com, 2012-13</i>			

Data also show that per hectare availability of quality/certified seeds is the highest in Andhra Pradesh, whereas it is the lowest in the state of Jharkhand. This might be indicative of higher varying seeds replacement rates across different states in India. It is well understood that Andhra Pradesh has the highest seed replacement rate amongst all Indian states.⁶ At the aggregate level, it is observed that Andhra Pradesh has the largest area under crops and has also the largest supply of quality/certified seeds – in fact, its total seed requirement is more than the total requirements of 15 states combined together.

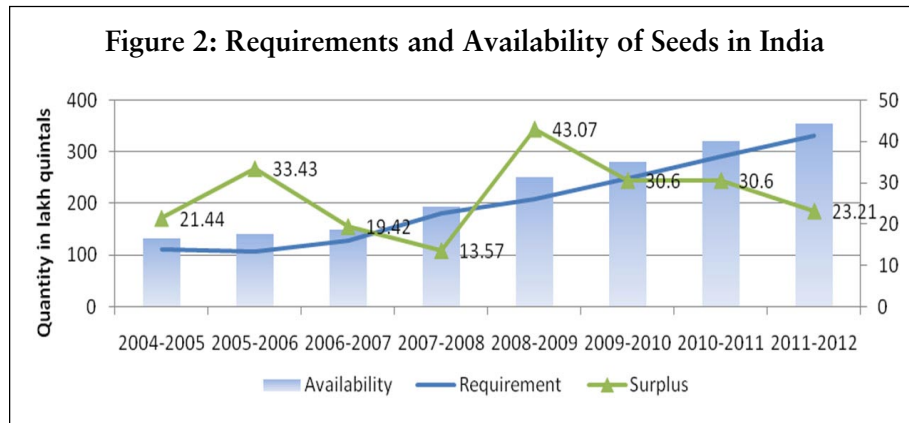
Table 2: State-wise Total Demand and Supply of Quality/Certified Seeds in India (Quantity, in lakh quintals)								
States/UT	2010-11			2011-12			2010-11	Supply of quality/certified seeds per hectare (quintal)
	Total requirements	Supply by Private Sector	Total Supply	Total requirements	Supply by Private Sector	Total Supply	Total cropped area (lakh ha)	
Andhra Pradesh	44.01	14.43	55.02	48.04	22.19	69.51	145.12	0.48
Bihar	13.13	6.61	13.68	15.8	8.95	17.06	41.60	0.41
Gujarat	8.11	6.56	9.2	13.76	10.82	14.14	122.47	0.12
Haryana	11.35	10.56	14.1	10.85	11.27	15.61	65.05	0.24
Jharkhand	3.39	2.78	5.25	5.65	0	1.01	12.49	0.08
Karnataka	11.04	4.32	15.3	11.6	5.11	13.48	130.62	0.10
Madhya Pradesh	23.52	17.47	31.08	29.16	14.21	33.12	220.46	0.15
Maharashtra	27.04	14.93	27.78	27.3	15.76	29.6	240.69	0.12
Odisha	6.86	0	7.64	8.35	0	6.24	54.29	0.11
Punjab	13.28	13.18	15.18	13.59	15.3	17.82	78.83	0.23
Rajasthan	18.42	9.62	19.25	20.42	12.04	24.99	260.02	0.10
Tamil Nadu	5.93	6.71	10	5.51	5.72	8.69	57.53	0.15
Uttar Pradesh	55.25	24.74	46.63	61.95	27.89	51.02	253.83	0.20
West Bengal	30.88	17.33	31.19	35.13	16.63	29.31	95.63	0.31
Other states*	18.86	6.66	20.06	23.3	7.07	22.01	194.93	0.11

Source: Indiatat.com, 2012-13

Note: *indicates the combined value of Arunachal Pradesh, Assam, Chhattisgarh, Goa, Himachal Pradesh, Jammu and Kashmir, Kerala, Meghalaya, Manipur, Mizoram, Nagaland, Pondicherry, Sikkim, Tripura, Uttarakhand,

Requirements & Availability of Seeds

Figure 2 shows the trend in requirement and availability of seeds in India. Data shows that the requirement and availability of seeds in India is increasing every year and availability is much higher than the requirement for each of the years. The figure also demonstrates that India has maintained seed surplus in all years.



3

India's Seed Trade with Other SAARC Countries

Low level of economic integration has its impact on low level of trade and cooperation. This is true for all the tradable products, but particularly for agricultural trade, including seeds. Seed trade in SAARC countries is very low compared to its potential⁷ and also when compared to trade with other countries outside the region. India's total export of selected nine seeds to the world and also the other SAARC countries may be grouped into three categories: food grains including maize, wheat, rice, barely; vegetables and fruits and fibre. A detailed analysis is presented in this section.

Overall, India's seed trade with other SAARC constitutes less than three percent of its total seed trade. Similarly, intra-SAARC trade with India is also observed to be quite low accounting for less than two percent in 2011, a clear indication of low level of cooperation in seed.

While the intra-regional cooperation is quite low, India has a dominant share when it comes to SAARC's overall trade in seeds. India, at present, accounts for almost three-fourths total seed export from the SAARC region. In comparison, its share in total import is less than 20 percent (Table 3).

This export domination of India, however, shows a declining trend over the period 2001-11. Its share in seed export from the SAARC region in 2001 was as high as 100 percent in 2001. In comparison to export, its share in total import is less than 20 percent. This establishes the fact that while India's seed industry has fared relatively better compared to other SAARC countries; it has not been able to penetrate markets of other South Asian countries optimally.

Table 3: Trend in India's Seed Trade within and outside SAARC Region						
Year	in US\$ thousand				in percent	
	Exports of seeds from India to SAARC	Exports of seeds from India to ROW (excluding SAARC)	Exports of seeds by SAARC Countries to India	Exports of seeds by SAARC Countries to ROW (excluding India)	India's seed trade to SAARC (% of its total trade)	Intra-SAARC seed trade with India (% of their total seed trade with the world)
2000-01	3,087	162,321	198	29	1.51	1.05
2001-02	4,900	121,591	4	55	2.79	1.9
2002-03	11,731	193,703	307	47,489	3.87	2.48
2003-04	23,532	260,685	139	28,736	4.50	3.39
2004-05	13,254	210,736	111	17,779	3.65	2.02
2005-06	16,706	220,523	219	19,023	3.69	1.96
2006-07	27,790	405,337	369	129,146	3.06	2.3
2007-08	39,393	591,029	353	95,560	2.32	1.22
2008-09	31,294	332,309	5,132	93,447	3.46	2.23
2009-10	41,702	520,410	650	37,893	3.25	2.53
2010-11	52,443	661,474	508	727,197	2.60	1.57

Source: ITC Trade Map, 2012-13

Data shows that India's export of seeds to the other SAARC countries constituted less than two percent of total seeds export from India in 2001. Data relating to nine select seeds shows that South Asia accounted for 1.87 percent of total export of seeds from India valued at US\$165mn in 2001. The share, however, increased to over 7.3 percent in 2011 out of total export from India (US\$713mn), reflecting an increasing trend and deeper integration over the decade.

It is also observed that while India's seed export to the world during 2001-11 increased by over four times, export to the South Asian countries increased by a whopping 17 times, realising a CAGR of 33 percent compared to a CAGR of 16 percent in case of seed export to the world.

Data on import of nine seeds by India from the world and other South Asian countries show a similar pattern. The share of South Asia in India's

import of nine seeds works out at a little over one percent (1.12 percent to be precise) out of total imports valued at US\$17mn in 2001. Notably, this low share of South Asia further declined to 0.47 percent out of total imports of these nine seeds valued at US\$108mn in 2011. This implies that while India's import of the selected nine seeds from the world has increased more than six times, it has decreased from the SAARC countries.

In other words, one can argue that while India was dependent on the world market for 98 percent of its imported seeds in 2001, in the later years this dependency has further increased to almost 100 percent in 2011.

Table 4 shows the net export and import of India's seed trade with the world. Data reveal that while India is a net exporter of fruit, oil, wheat, rice, maize, grain sorghum and barley seed; it is a net importer of vegetable seed (2011). It is also reflected that the net position of India has varied during the period 2001-11 in case of buckwheat and wheat seeds.

Table 4 also reflects that the net export of vegetable seed⁸ from India has declined over the period 2001-2011. The gap between export and import of vegetable seed has widened by about four times. On the other hand, net export from India in case of fruits, oil⁹ and maize seed has increased five times. In other cases also, net export situation has significantly improved.

Types of seed	India's net position as seed exporter										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	-4,409	-7,463	-9,560	-8,893	-13,208	-9,414	-8,743	-20,391	-29,498	-26,290	-18,158
Fruit Seed	2,783	10,372	3,162	3,070	3,282	5,637	7,771	6,197	6,371	10,555	14,628
Oil Seed	145,695	92,537	143,637	176,079	171,514	171,924	311,985	439,055	220,138	424,078	568,376
Wheat Seed	0	0	31,952	12,546	5,859	-24,221	1	28	0	14	35
Rice Seed	0	0	463	1,450	1,069	2,882	5,264	1,980	5,842	13,368	17,297
Maize Seed	3,665	7,797	8,860	66,787	12,198	11,746	15,896	75,187	28,172	19,865	16,924
Grain Sorghum Seed	0	0	1,834	862	764	2,181	1,430	4,308	5,905	14,608	5,971
Barley Seed	0	0	9	1,245	32	34	24,200	20,533	5,542	153	57
Buckwheat Seed	0	0	-8	-14	-89	-30	-302	-69	-101	-111	145

Source: ITC Trade Map, 2012-13

*Net position is computed by subtracting total import of nine seeds from total export of nine seeds.

Integrating India's net export position with the SAARC countries' (including India) import position reveals an interesting scenario. Table 5 shows the SAARC seed import from the world for the last decade, 2001-10. During this period, overall seed import in SAARC countries shows a fluctuating trend. However, when one compares seed import for 2001 to the 2010 period, it is observed that import of all nine seeds except wheat has increased. Total seed import of nine seeds in SAARC countries increased by over four times.

At individual level, increase in import of rice seeds was the highest (1,000 times) followed by grain sorghum (474 times during 2002-10), barley seed (221 times), oil seed (19 times), buckwheat and maize seed (10 times), fruit seed (six times) and vegetable seed (five times).

This implies that while India's net export position has improved, South Asian countries' import has also increased, creating a complementarity between export from India and import by SAARC countries.

Types of seed	SAARC countries position as seed importer									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Vegetable Seed	14,510	18,664	28,978	32,143	46,954	48,718	56,383	56,354	68,941	82,601
Fruit Seed	1,883	2,532	1,869	1,566	4,727	7,019	14,102	13,367	13,821	12,368
Oil Seed	3,577	19,636	37,750	36,352	38,486	49,065	54,621	70,096	92,061	69,264
Wheat Seed	72,042	16,500	12,410	42,141	148,548	159,084	73,125	1,275,612	254,005	65,006
Rice Seed	23	803	2270	6,305	6,983	154,809	12,062	15,850	14,946	23,214
Maize Seed	20,701	47,494	67,408	57,088	71,847	70,077	73,280	107,072	155,489	213,717
Grain Sorghum Seed	0	15	8	293	55	102	149	3,978	5,619	7,123
Barley Seed	9	101	110	136	1,409	3,999	499	1,132	2,051	1,996
Buckwheat Seed	451	478	1,210	616	1,361	878	1,443	3,580	9,292	4,947
Total	113,196	106,223	152,013	176,640	32,030	493,751	285,664	1,547,041	616,225	480,236

Source: ITC Trade Map, 2012-13

India's growing importance as supplier of seeds is, however, not reflected by the penetration of Indian seeds in the other South Asian market (Table 6). The table presents India's share in SAARC total seed import (nine seeds) from world for the last 11 years.

From the table, it emerges that India's share in SAARC import of vegetable, fruit, and oil seed has decreased over the one-decade period. The maximum percentage decline has been recorded in fruit seed (from over 96 percent to 22 percent) followed by vegetable (from over 89 percent to about 54 percent), oil seed (from over 80 percent to about 72 percent).

Interestingly, data reveal that there is no import of HYV food grain seed from India to other SAARC countries. These include wheat, rice, maize, grain sorghum and barley.

A clear revelation from the data is that while India is in a better position to serve import requirements of seeds of other South Asian countries, in practice there is not much development. This is reflected in negligible/declining share of India in South Asian countries' total import of seeds.

Types of seed	India's Share in SAARC Seed Import (Figures in percent)										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	89.4	77.7	54.2	53.2	50.9	51.8	56.5	65.9	69.8	58.5	53.7
Fruit Seed	96.3	62.1	45.2	59.1	51.4	37.6	10.5	14.2	12.3	15.5	22.2
Oil seed	80.8	36.5	22.6	35.8	42.0	48.9	76.5	92.0	77.4	80.1	71.5
Wheat Seed	0.0	0.0	0.0	0.0	0.0	15.4	0.0	0.0	0.0	0.0	0.0
Rice Seed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maize Seed	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
Grain Sorghum Seed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barley Seed	0.0	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buckwheat Seed	0.0	0.0	1.3	7.6	6.6	5.7	24.5	2.0	1.1	2.4	0.5
India's share in SAARC total import (9 seeds)	16	22	17	18	14	21	38	7	21	31	16

Source: ITC Trade Map, 2012-13

India's importance as a growing seed market is fully demonstrated by the share of India in SAARC total export (Table 7). India's percentage share in SAARC seed export to the world is over 94 percent in three seeds, namely vegetable, fruits and oil seeds. In case of rice seeds also, the share is quite high at over 72 percent.

However, in most of the cases, a fluctuating trend is observed. In one case (maize), it is also observed that India's share in SAARC total export to the world is continuously declining from 24.8 percent in 2001 to 1.5 percent in 2011. It implies that other SAARC countries, such as Bangladesh, have emerged bigger players over the last decade.

Types of Seed	India's Share in SAARC Seed Export (in percent)										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	99.9	100	93.3	92.2	95.9	94.4	96.5	99.0	98.4	97.4	97.9
Fruit Seed	100	99.9	90.9	95.0	97.5	98.5	99.6	97.4	88.9	94.4	97.3
Oil Seed	100	100	96.2	87.7	94.7	93.5	92.7	93.1	86.7	93.5	95.7
Wheat Seed	0.0	0.0	25.9	15.3	54.7	11.0	0.0	0.1	0.0	6.0	0.0
Rice Seed	0.0	0.0	9.0	53.7	12.9	29.0	61.9	26.0	33.2	99.5	72.5
Maize Seed	24.8	43.0	29.8	35.3	16.5	11.2	5.1	7.9	4.9	3.7	1.5
Grain Sorghum Seed	0.0	0.0	14.4	13.9	14.5	19.4	24.0	18.2	47.6	37.9	37.4
Barley Seed	0.0	0.0	5.2	71.8	31.4	17.9	28.5	31.6	80.0	1.9	0.4
Buckwheat Seed	0.0	0.0	0.2	0.3	0.0	0.1	0.3	0.0	0.0	0.0	0.6
India's share in SAARC total export (9 seeds)	100	100	86	94	95	95	86	94	91	97	73

Source: ITC Trade Map, 2012-13

An Overview

Analysis of data for the 10-year period demonstrates that the overall export of seeds from India to other SAARC countries (Bangladesh, Pakistan, Nepal, Sri Lanka and Maldives) has increased by a whopping over 17 times from US\$3mn to over US\$52mn (Table 8).

Growth in exports at country levels is, however, not uniform. While seed export to Nepal has increased by over 57 times; export of seeds to

Pakistan multiplied by 19 times. The exceptional increase in export of seed from India to Nepal is seemingly because of a combination of factors such as inadequate local infrastructure and similarities in agro-climatic condition.

Another important factor could be a good political relationship between the two countries. Bangladesh also recorded a less than 10 times increase in seed import from India. The lowest increase was recorded in case of Sri Lanka. In between years, a clear fluctuation is also observed.

Table 8: Trend in Export of Seeds from India to Other SAARC Countries

Region	Export of seeds from India to other SAARC countries (US\$ Thousand)										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
World	165,408	126,491	205,434	284,217	223,990	237,229	433,127	630,422	363,603	562,112	713,917
SAARC	3,087	4,900	11,731	23,532	13,254	16,706	27,790	39,393	31,294	41,702	52,443
Bangladesh	594 (19.24)	249 (5.08)	5,370 (45.78)	1,806 (7.67)	3,362 (25.37)	3,011 (18.02)	2,467 (8.88)	3,101 (7.87)	3,620 (11.57)	2,774 (6.65)	4,936 (9.41)
Pakistan	973 (31.52)	1513 (30.88)	1,484 (12.65)	2,190 (9.31)	3,160 (23.84)	5,898 (35.30)	8,983 (32.32)	8,811 (22.37)	11,876 (37.95)	21,074 (50.53)	19,048 (36.32)
Nepal	360 (11.66)	1,968 (40.16)	3,353 (28.58)	7,368 (31.31)	3,820 (28.82)	5,412 (32.40)	11,636 (41.87)	24,074 (61.11)	12,357 (39.49)	9,498 (22.78)	22,542 (42.98)
Sri Lanka	390 (12.63)	602 (12.29)	426 (3.63)	10,062 (42.76)	2,756 (20.79)	950 (5.69)	2,073 (7.46)	1,084 (2.75)	1,311 (4.19)	944 (2.26)	1,460 (2.78)

Source: ITC Trade map, 2012-13

Note: figure in bracket shows the percentage value.

A similar pattern is revealed in case of export of seeds from other SAARC countries to India in 2001-11). As indicated above, data reflect that the import of seeds by India from other South Asian countries is significantly low compared to import from the world (Table 9). The share works out to a little over one percent in 2001, and further lower at 0.47 percent in 2011.

During the 10-year period, it is also observed that while seed import from the world increased by over six times, increase in import from the SAARC countries was only about 2.5 times, much lower compared to

import from the world. It is also found that the share of India's import of seed from other SAARC countries has fluctuated over the years. Overall, the share of SAARC countries in India's total import of nine seeds has been below one percent except for two year 2003 (1.22 percent) and 2009 (4.23 percent). And mostly, the import of India's seed is from Pakistan.

Table 9: Trend in Import of Seeds by India from other SAARC Countries

Region	Import of seeds by India from other SAARC countries (US\$ Thousand)										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
World	17,674	23,248	25,085	31,085	42,569	76,490	75,625	103,594	121,232	105,872	108,642
SAARC	199	4	341	210	127	666	618	572	5,319	1,593	755
Bangladesh	0 (0)	1 (25)	0 (0)	0 (0)	0 (0)	0 (0)	16 (2.59)	0 (0.00)	41 (0.77)	0 (0.00)	175 (23.18)
Pakistan	198 (99.50)	3 (75.00)	279 (81.82)	92 (43.81)	21 (16.54)	25 (3.75)	0 (0.00)	282 (49.30)	4,988 (93.78)	527 (33.08)	244 (32.32)
Nepal	1 (0.50)	0 (0.00)	62 (18.18)	118 (56.19)	106 (83.46)	641 (96.25)	602 (97.41)	290 (50.70)	290 (5.45)	1,066 (66.92)	336 (44.50)

Source: ITC Trademap, 2012-13

Note: figure in bracket shows the percentage value.

Not much variation with respect to other SAARC countries' share in India's total export and import are observed when the analysis is extended crop-wise. There is no consistency in trade for different seeds. However, SAARC countries' share in India's overall export is found to be much higher than their share in India's overall import of seeds (Table 10).

It can be noted that the share of SAARC countries in India's total import of nine seeds is below one percent in all the years except fruit and buckwheat seed whose share is 4.2 percent and 100 percent in 2011. The share of India's export to other SAARC countries from India has fluctuated in most seeds, except vegetable seed, in which it has increased from 12.3 percent in 2001 to 50 percent in 2011. Interestingly, the share of export of rice seed from India to other SAARC countries shows a declining trend.

Types of Seed		Yearly trend in share (in percent)												
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011		
Vegetable Seed	Import	1.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Export	12.3	23.0	34.3	32.3	35.1	39.2	41.2	32.1	35.9	64.1	50.0		
Fruit Seed	Import	0.00	0.2	3.4	5.4	0.8	0.8	0.0	1.0	0.0	0.0	4.2		
	Export	10.38	1.8	7.8	11.2	21.2	25.2	21.6	25.2	34.9	22.8	23.8		
Oil Seed	Import	0	0	3.0	0	0	0.6	0.0	0.4	7.0	0.9	0.4		
	Export	0.5	2.4	2.3	3.8	1.7	1.9	2.5	4.8	4.1	1.3	3.2		
Wheat Seed	Import	-	-	-	-	-	0	-	-	-	-	-		
	Export	-	-	14.8	5.3	29.6	87.5	100	100	-	0	100		
Rice Seed	Import	-	-	-	-	0	-	-	-	-	-	-		
	Export	-	-	23.5	79.7	62.7	27.1	54.4	4.3	14.2	13.6	12.8		
Maize Seed	Import	-	0	-	-	0	0	0	0	0	-	-		
	Export	21.0	8.0	11.2	17.2	21.4	22.1	25.3	7.7	20.7	48.1	46.7		
Grain Sorghum Seed	Import	-	-	-	-	-	-	-	-	-	-	-		
	Export	-	-	2.1	2.6	20.9	44.1	29.9	44.1	54.7	47.7	60.0		
Barley Seed	Import	-	-	0	-	-	-	-	-	-	-	-		
	Export	-	-	80	0	0	26.5	0.0	0.3	0.0	45.8	0		
Buckwheat Seed	Import	-	-	100	100	100	100	100	100	100	100	100		
	Export	-	-	0	24.2	0.0	0.0	74.5	0.0	0.0	0.0	0.5		

Source: ITC Trade Map, 2012-13

Notes: (-) indicates that trade data are not available during the periods.

Seed-related Sensitive List under SAFTA and Applied MFN Tariff

It is here important to note that intra-regional seed trade in SAARC is influenced by a number of factors. Seemingly, the most important of these are sensitive product lists of member-countries under SAFTA and also applied MFN tariffs. Under the revised sensitive list, even though members have significantly reduced their list of products, the number still is quite high as demonstrated by Table 11.

Table 11: Negative List of SAARC Member Countries		
Member State	Number of Products in the earlier Sensitive Lists	Number of Products in the Revised Sensitive Lists (Phase-II) (effective from 01 January 2012)
Afghanistan	1,072	858
Bangladesh	1,233 (LDCs), 1,241 (NLDCs)	987 (LDCs), 993 (NLDCs)
Bhutan	150	156
India	480 (LDCs), 868 (NLDCs)	25 (LDCs), 614 (NLDCs)
	Maldives	681 154
Nepal	1,257 (LDCs), 1295 (NLDCs)	998 (LDCs), 1,036 (NLDCs)
Pakistan	1,169	936
Sri Lanka	1,042	[845 (LDCs)], 906 (NLDCs)
<p><i>Source: South Asian Association for Regional Cooperation</i> http://saarc-sec.org/areaofcooperation/detail.php?activity_id=35</p>		

Moreover, in most of the member-countries, a large number of seeds continue to be in the sensitive list. For example, while India has 19 different types of seeds in the sensitive list, Afghanistan has 15. A detailed list of seeds maintained by member countries in sensitive list is enumerated in Annexure 1.

Besides, most of the member-countries apply MFN tariffs on import of certain seed products. This could be for the obvious reason of protecting one's domestic seed industry from external competition. A detailed list of MFN tariffs applied by member countries in SAARC is presented as Annexure 2.

4

Potential of Seed Trade and Revealed Comparative Advantage

To assess the potentiality of seed trade between the SAARC member countries, and the positioning of different member countries, techniques of RCA and bilateral trade intensity index have been applied. RCA for India and other SAARC countries has been computed. A revealed comparative advantage is calculated to understand the relative advantage or disadvantage of a certain country in a certain class of goods or services as evidenced by trade flows.

Computation of revealed comparative advantage relies on bilateral trade intensity index, that has been computed for India on the one hand and other SAARC countries on the other. It might be noted that bilateral trade intensity index is used to explain the flow of trade between two regions. In the present case, it is India and other SAARC countries. The process is reversed to understand flow of seed from other SAARC countries to India.

Table 12 summarises the results obtained from the RCA analysis. The table establishes the fact that India has revealed comparative advantage in eight out of nine seed categories traded between India and other SAARC countries for the entire period 2001-11. The table reflects that there is big scope and opportunity for both India and other SAARC countries in seed. Both India and other SAARC countries stand to potentially gain from trade in these nine seeds.

Table 12: Trade Potentials between India and Other SAARC Countries by RCA		
<i>Commodities</i>	<i>India</i>	<i>Other SAARC countries</i>
Vegetable Seed	Potential Exporter	Potential Importer
Fruit Seed	Potential Exporter	Potential Importer
Oil Seed	Potential Exporter	Potential Importer
Wheat Seed	Potential Exporter	Potential Importer
Rice Seed	Potential Exporter	Potential Importer
Maize Seed	Potential Exporter	Potential Importer
Grain Sorghum	Potential Exporter	Potential Importer
Barley Seed	Potential Exporter	Potential Importer
Buckwheat Seed	Potential Importer	Potential Exporter

However, it is important to emphasise that there exists potential for bilateral and intra-regional trade between India and other SAARC countries. This is because while India has comparative advantage in some, other SAARC countries have advantages in others. This is, however, a dynamic situation and can change over time.

Seed-wise revealed comparative advantage in seed trade between India and other SAARC countries is appended as annexures (see Annexure 3). Country-wise and seed-wise revealed comparative advantage of different SAARC countries is shown in Annexure 4.

5

Conclusion and Policy Recommendations

From the analysis and results obtained above, one can conclude that India has fair potential to meet the import needs of the SAARC region. The scope of benefiting from the bilateral trade with SAARC region looks quite good. Greater opening of seed trade might help other member-countries in SAARC to have better access to quality/certified seeds. These countries might also benefit from the efficiency which trade will bring in to their respective domestic markets.

Considering the mutual benefits which could be ushered in as a result of seed trade, countries in South Asia need to join hands to avail existing potential and opportunities within the region and further to address challenges to food security and poverty reduction.

The tasks at hand are challenging, considering the present low level of cooperation reinforced by trust deficit. To have a real breakthrough, some focused and time bound initiatives are required. Some of these include the following:

Presently a clear understanding of seed market in the South Asian countries is missing. It is difficult of the countries in the region to design solutions, unless there is a proper assessment of what is available and what needs to be done. There is urgent need for understanding of market dynamics, demand-supply and gap; capacity of each county to meet seed requirement of domestic and regional market. These should also include proper assessment of challenges faced at the country level keeping regional perspective in view.

Considering that seeds are living basic inputs for a sustainable agricultural growth, South Asian countries should come forward with initiatives such as identifying major varieties that could be adapted to other countries in the region.

Research institutions in one or more countries in the region should design a plan of action for engagements with similar institutions in other countries. Such engagements could be premised on what is required to not only ensure adequate seed production for the local market, but also to meet regional demand. The focus, obviously, should be on development and use of seeds.

The SAARC Seed Bank is a noble initiative. Its objective could be embedded with focused and time bound activities and initiative to effectively address seed-related challenges faced by the region.

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Endnotes

1. SAARC, established in 1985, consists of eight countries in South Asia namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. Afghanistan is a relatively new entrant, having joined the group in April 2007
2. Afghanistan from over 45 percent in 2002 to less than 30 percent in 2010; Bangladesh from 24 percent in 2001 to a little over 18 percent in 2011; Bhutan from about 28 percent in 2001 to about 19 percent in 2009; India from 23 percent in 2001 to less than 18 percent in 2011; Maldives from about 10 percent in 2001 to about 3 percent in 2010; Pakistan from over 24 percent in 2001 to less than 22 percent in 2011; and Sri Lanka from 20 percent in 2001 to about 13 percent in 2011
3. IFPRI (2011), “The Seed and Agricultural Biotechnology Industries in India: An Analysis of Industry Structure, Competition, and Policy Options”, IFPRI Discussion Paper 01103, July 2011, available at: www.ifpri.org/sites/default/files/publications/ifpridp01103.pdf
4. It might be noted that Breeder seed is used for the production of foundation seed and certified seeds
5. The estimate of total seed requirement in India is based on state-level estimate of seed requirements presented at the Bi-annual (Kharif and Rabi) national-level conferences. Each of the states are invited and present their seed requirement for Kharif and Rabi cropping seasons
6. For details, see CUTS (2013), Dynamics of Rice Seeds Trade: Need for Cooperation between India and Bangladesh, available at: www.cuts-citee.org/RISTE/pdf/Dynamics_of_Rice_Seeds_Trade-Need_for_Cooperation_between_India_and_Bangladesh.pdf
7. Consumers and Economic Cooperation: *Cost of Economic Non-cooperation to Consumers in South Asia*, CUTS International, 2012, available at: www.cuts-citee.org/pdf/Consumers_and_Economic_Cooperation-Cost_of_Economic_Non-cooperation_to_Consumers_in_South_Asia.pdf
8. Vegetable seed includes cabbage, cauliflower, onion, pea, radish, tomato, among others
9. Oil seed includes palm nuts and kernel, cotton, mustard, coaster, sesamum, safflower, melon, poppy, sea nuts

Annexure 1: Country-wise Revised Sensitive List Relating to Seeds under SAFTA

Afghanistan's Revised Sensitive List in Seeds under SAFTA	
9092000	Seeds of coriander
9093000	Seeds of cumin
9094000	Seeds of caraway
9095000	Seeds of fennel; juniper berries
12051000	Low erucic acid rape or colza seeds
12060000	Sunflower seeds, whether or not broken
12072000	Cotton seeds
12074000	Sesamum seeds
12075000	Mustard seedsa
12091000	Sugar beet seed
12092100	Lucerne (alfalfa) seed
12092200	Clover (Trifolium spp.) seed
12092300	Fescue seed
12093000	Seeds of herbaceous plants cultivated principally for their flowers
12099100	Vegetable seeds

Bangladesh's Revised Sensitive List in Seeds under SAFTA	
90920	Seeds of coriander
90930	Seeds of cumin

India's Revised Sensitive List* in Seeds under SAFTA	
070110	Potatoes seeds
071339	Guar seeds
090920	Seeds of coriander
090940	Seeds of Carrway
100510	Maize seeds
120100	Soya Beans of seed quality
120210	Groundnut seeds
120400	Linseed
120510	Rape Seeds
120600	Sunflower seeds
120710	Palm nuts of seed quality
120720	Cotton seeds
120730	Castor Oil Seeds
120740	Seasum Seeds
120750	Mustard Seeds
120760	Safflower Seeds
120791	Poppy Seeds
120799	Other Oil Seeds (Ajams, Mango kernel, niger seed, kokam and others)
120810	Soyabeans
<i>*Relates to LDCs.</i>	

Pakistan's Revised Sensitive List in Seeds under SAFTA	
100110	Durum wheat

Sri Lanka's Revised Sensitive List in Seeds under SAFTA	
9011110/ 9011210	Coffee Seeds
90910	Seeds of anise or badian
90940	Seeds of caraway
120740	Sesamum seeds
120750	Mustard seeds
12079910	Tea seeds

Source: SAARC Secretariat,
http://saarc-sec.org/areaofcooperation/detail.php?activity_id=35

Annexure 2: Applied MFN Rate by SAARC Countries on Import of Seeds

Bangladesh		
HS Code	Types of seed	HS 2007 (percent)
10061010	Rice seed, wrapped/canned upto 2.5kg	0.00
120991	Vegetable seed	0.00
120999	Fruit Seed	0.00
1207	Oil seed, wrapped/canned upto 2.5kg	25
10051000	Maize, wrapped/canned upto 2.5kg	0.00
10071010	Grain Sorghum, wrapped/canned upto 2.5kg	5
100310	Barley, wrapped/canned upto 2.5kg	0.00
10081010	Buckwheat, wrapped/canned upto 2.5kg	12
10011010	Wheat seed upto 2.5kg	5

India		
HS Code	Types of seed	HS 2007 (percent)
10061010	Rice seed	80
120991	Vegetable seed	5
120999	Fruit seed	5
1207	Oil seed	30
10051000	Maize	50
10071010	Grain Sorghum	50
100310	Barley Seed	0.00
10081010	Buckwheat	0.00
10011010	Wheat seed	50

Maldives		
HS code	Types of seed	HS 2007 (percent)
10061010	Rice seed	15
120991	Vegetable seed	15
120999	Fruit seed	15
1207	Oil seed	15
10051000	Maize	15
10071010	Grain Sorghum	15
100310	Barley	15
10081010	Buckwheat	15
10011010	Wheat seed	15

Nepal		
HS Code	Types of seed	HS 2007 (percent)
10061010	Rice seed	10
120991	Vegetable seed	10
120991 Free trade agreement duty rate for SAFTA		7
120999	Fruit Seed	10
120999 Free trade agreement duty rate for SAFTA		7
1207	Oil Seed	10
1207 Free trade agreement duty rate for SAFTA		7
10051000	Maize	10
10071010	Grain Sorghum	10
10071010 Free trade agreement duty rate for SAFTA		7
100310	Barley	10
100310 Free trade agreement duty rate for SAFTA		7
10081010	Buckwheat	10
10081010 Free trade agreement duty rate for SAFTA		7
10011010	Wheat seed	10
10011010 Free trade agreement duty rate for SAFTA		7

Pakistan		
HS code	Types of seed	HS 2007 (percent)
10061010	Rice seed	0.00
120991	Vegetable seed	0.00
120999	Fruit seed	0.00
1207	Oil seed	0.00
10051000	Maize	0.00
10071010	Grain Sorghum	0.00
100310	Barley	5
10081010	Buckwheat	5
10011010	Wheat seed	10

Sri Lanka		
HS code	Types of seed	HS 2007 (percent)
10061010	Rice seed	Rs20/kg
120991	Vegetable seed	0.00
120999	Fruit seed	0.00
1207	Oil seed	30
1207 Preferential duty rate for India under the Indo-Sri Lanka free trade agreement		0.00
1207 Free trade agreement duty rate for Pakistan		0.00
1207 Free trade agreement duty rate for SAFTA		17.50
1207 Free trade agreement SAFTA		5
10051000	Maize	0.00
10071010	Grain Sorghum	30
10071010 Free trade agreement duty rate with Pakistan		0.00
100310	Barley	15
100310 Preferential duty rate for India under the Indo-Sri Lanka free trade agreement		0.00
100310 Free trade agreement duty rate for Pakistan		0.00

100310	Free trade agreement duty rate for SAFTA	10.83
100310	Free trade agreement duty rate for least developed countries under the South Asia	4.50
10081010	Buckwheat	30
10081010	Free trade agreement duty rate for Pakistan	0.00
10011010	Wheat seed	0.00

Source: WTO, <http://tariffanalysis.wto.org/report/TariffLines.aspx>

Annexure 3: Seed Trade Intensity of India and Other SAARC Countries

The analysis below provides the trade intensity index of seed trade between India and SAARC, Bangladesh, Pakistan and Nepal. The trade intensity index provides the flow of trade between India and SAARC countries. This index has been used since 1960 to analyse the direction and magnitude of international trade. The intensity index allows the country to trade with each other more or less depending on its value. The importance of this index is that it can capture the small changes in trade between two countries. It can also highlight the small change in trading countries even if their earlier pattern of trade happens to be small.

Bilateral trade intensity index measures are an exporter's penetration of an importer's market within the context of overall world trade. A formula of this index is as follows:

$$IT_{ij} = (X_{ij} / X_{iw}) / (M_{jw} / M_{ww}) \dots \dots \dots (i)$$

Share of I's export going to j
Share of world import going to j

Alternatively, if one abstracts from transportation margin, then this index can also be reshaped to focus on exporting country and its competing suppliers in market j. In that case, the IT index becomes supply, a ratio of destination shares (ds) as is stated below:

$$IT_{ij} = ds_{ij} / ds_{wj} = (X_{ij} / X_{iw}) / (X_{wj} / X_{ww}) \dots \dots \dots (ii)$$

Share of I's export going to j
Share of world export going to j

Where X_{ij} is export from country I to country j; X_{iw} is total exports to the world by country I; X_{wj} is total export to country j; X_{ww} is total world export; M_{ji} is import of country j from country I; M_{jw} is total imports from the world by country j; M_{ww} is total world imports; ds is destination share.

A unit value of IT_{ij} shows that country I has no gain in supplying of country j or supplying the same in foreign markets. Following the results of second equation, if $IT_{ij} > 1$ implies that nation "j" is an important market for exporter I, than for any other country of the world. Likewise, if $0 < IT_{ij} < 1$, then country j would be a less important market for I than any other country exporting to j.

The bilateral trade intensity index has been computed by using the second equation for the nine seeds as mentioned above. It has been computed for the period 2001-11. The changes in the results of this index will show the experience of trade of increasing or decreasing over the time.

Table A.1 shows that SAARC countries has offered good market for seed from Indian origin over the last one decade. Data show that while supply of seeds from India to SAARC countries like vegetable, maize and barley has been increasing, Indian seed like fruit, oil, wheat, rice, grain, sorghum have also penetrated markets in other SAARC countries over the last one decade. However, the bilateral trade intensity index of the seed has come down in the last decade. The bilateral trade intensity index of most of the seeds is greater than one except one buckwheat seed whose value is less than one. So SAARC region has potential market to import seeds from the Indian origin.

Bilateral Trade Intensity Statistics

It is revealed that the bilateral trade intensity index of seed from SAARC region to India in most of cases is very small (less than one) as compared to export of seeds from India to other SAARC countries during last one decade except one (buckwheat seed whose value is greater than one). Buckwheat seed shows an increasing trend over the last decade. The results show that seeds from other SAAARC countries have not been able to fully penetrate Indian market in this period.

Thus, India having a bigger market has not been fully utilised by other SAARC countries. On the contrary, other SAARC countries have offered good import market for the seed originating from India.

Table A.1: Bilateral Trade Intensity Index of India and other SAARC Region											
Types of seed	Bilateral Trade Intensity Index										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	8.72	14.47	16.35	16.64	12.90	14.83	16.08	13.97	14.04	22.48	19.11
Fruit Seed	9.89	1.33	9.29	18.14	12.41	9.95	5.23	7.12	9.76	7.93	7.64
Oil Seed	1.50	1.20	0.68	1.52	0.67	0.63	0.97	2.00	1.15	0.62	1.25
Wheat Seed	-	-	21.35	2.03	3.03	10.24	41.79	3.65	-	0.00	17.89
Rice Seed	-	-	41.20	52.15	37.80	0.77	22.55	2.40	7.46	6.04	2.10
Maize Seed	90.08	16.75	18.40	35.45	33.89	41.89	71.25	19.46	26.44	52.44	67.72
Grain Sorghum	-	-	1,917.92	57.97	2,307.16	2,988.65	2,879.89	189.71	88.01	74.81	5,756.62
Barley Seed	-	-	21,573.19	0.00	0.00	234.60	5.53	20.32	0.00	1,140.02	0.00
Buckwheat Seed	-	-	0	121.48	0.00	0.00	229.82	0.00	0.00	0.00	0.26

Source: Source: ITC Trade Map

Note: (-), indicate that country has not traded the seeds during the period

Table A.2: Bilateral Trade Intensity Index of other SAARC Region and India, 2001-2011											
Types of seed	Bilateral Trade Intensity Index										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	1.64	0.01	0.03	0.26	0.00	0.00	0.00	0.00	0.02	0.00	0.07
Fruit Seed	0	0.02	0.86	2.03	0.20	0.10	0.00	0.06	0.00	0.00	0.25
Oil Seed	0	0	0.05	0.00	0.00	0.02	0.00	0.02	0.49	0.05	0.01
Wheat Seed			0	0	0	0	0	0		0	0
Rice Seed			0	0	0	0	0	0	0	0	0
Maize Seed	0	0	0	0	0	0	0	0	0	0	0
Grain Sorghum			0	0	0	0	0	0	0	0	0
Barley Seed			0	0	0	0	0	0	0	0	0
Buckwheat Seed			503.20	713.72	23,970.68	1,066.28	2,134.94	6,151.30	3,085.42	1,598.52	19.38

Source: ITC Trade Map, 2012-13

Notes: (-) indicates that trade has not occurred during that period.

This clearly indicates that SAARC as a whole except India did not reported any amount of exporting value to the world.

Table A.3 indicates bilateral trade intensity index of India and Bangladesh from 2001 to 2011. Bangladesh has offered good market for seed originating in India side. The index value of seed like vegetable seed, fruit seed, and maize seed have shown increasing trend over the last one decade. Large fluctuation in index value of wheat seed has been recorded in this period. But index value of rest of the seed has been showing decreasing trend and its index value is less than one in most of seeds.

Types of seed	Bilateral Trade Intensity Index										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	-	9.87	60.70	39.92	27.03	21.40	10.93	22.94	19.92	26.39	35.89
Fruit Seed	-	1.47	26.99	110.01	73.20	33.19	34.53	33.42	40.28	20.18	21.76
Oil Seed	-	0.00	0.00	0.03	0.00	0.03	0.00	1.18	0.50	0.14	0.00
Wheat Seed	-	-	26.33	18.46	62.35	408.99	0.00	159603.81	-	0.00	16.73
Rice Seed	-	-	14.24	1.63	0.11	0.02	0.98	0.48	0.09	3.33	0.47
Maize Seed	-	20.63	28.75	21.87	4.74	49.24	107.06	58.15	14.47	55.15	63.99
Grain Sorghum Seed	-	-	-	-	-	-	-	1.45	0.63	0.40	572.29
Barley Seed	-	-	52734.45	0.00		0.00	0.00	-	-	0.00	-
Buckwheat Seed	-	-	-	-	-	-	-	-	-	-	-

Source: ITC Trade Map, 2012-13
Notes: (-) indicates that trade has not occurred during that period

Analysis shows that seeds from India have been able to penetrate markets in Pakistan. The intensity index of India with Pakistan has realised an increasing trend in vegetable, fruit, oil, maize and grain sorghum seed. The index value of rest of the seed is either zero or have shown decreasing trend in the last decade. Analysis and results also show that India has potential and opportunity to export the seed in Pakistan market.

Table A.4: Bilateral Trade Intensity Index for India with Pakistan											
Types of seed	Bilateral Trade Intensity Index										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	-	-	31.20	38.12	27.03	31.77	52.86	55.86	67.66	68.85	55.32
Fruit Seed	-	-	8.21	9.14	4.39	0.71	0.71	1.66	2.88	1.90	3.73
Oil Seed	-	-	0.99	1.36	0.04	1.88	0.00	0.24	1.53	6.95	3.46
Wheat Seed	-	-	-	0.00	0.00	0.63	0.00	0.00	-	0.00	0.00
Rice Seed	-	-	-	-	-	0.00	-	-	0.02	4.18	0.00
Maize Seed	-	-	8.47	0.74	0.99	24.10	4.34	13.71	54.36	86.44	91.74
Grain Sorghum Seed	-	-	-	-	-	-	117,44.50	103,379.01	11,986.99	53,264.66	11,5661.03
Barley Seed	-	-	0	0	0	3,958.567	0	0	0	0	0
Buckwheat Seed	-	-	-	-	-	-	-	-	-	-	-
<i>Source: ITC Trade Map, 2012-13</i>											
Notes: (-) indicates that trade has not occurred during that period											

As reflected by Table A.5, seed trade data for India and Nepal is not available in many years. Available data indicate that Nepal is a good exporting destination of seed originating in India. The index value of most of the seed is greater than one.

Types of seed	Bilateral Trade Intensity Index										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	-	-	34.46	-	-	-	-	-	27.10	71.56	13.45
Fruit Seed	-	-	12.85	-	-	-	-	-	43.47	250.60	39.00
Oil Seed	-	-	13.97	-	-	-	-	-	37.95	13.08	5.46
Wheat Seed	-	-	1.87	-	-	-	-	-	-	0.00	13,990.80
Rice Seed	-	-	62.14	-	-	-	-	-	201.15	19.70	7.50
Maize Seed	-	-	48.11	-	-	-	-	-	165.07	43.39	76.94
Grain Sorghum Seed	-	-	-	-	-	-	-	-	-	-	-
Barley Seed	-	-	0	-	-	-	-	-	0	0	0
Buckwheat Seed	-	-	0	-	-	-	-	-	0	0	1.40

Source: ITC Trade Map, 2012-13
 Note: (-), indicate seed trade data is not available

Pattern of Revealed Comparative Advantage

The bilateral trade intensity index shown above explains the importance of a particular country as an export destination for the products of other countries. The results above shown can be compared with the revealed comparative index (RCA). This estimate will help to distinguish between exportable showing improved comparative advantages from those that show declining tendencies or none at all.

Comparative advantage is generally used to understand the pattern of trade. The concept of comparative advantages contains the features of theoretical as well as policy discussions. RCA of a country in a particular good is the ratio of net export to its total trade in that good. A formula can be written as follows:

$$RCA = (X_{ih} - M_{ih}) / (X_{ih} + M_{ih}) \dots\dots\dots (iii)$$

Where X_{ih} denotes export of country I for commodity h, M_{ih} denotes import of I for the commodity of h.

The RCA value of a country evaluates the trade performance of the country and simultaneously and also shows the exporting and importing

of a particular commodity. The RCA value ranges from -1 to +1; where -1 indicates that there are no export from country ($X_{ih} = 0$) which reveals comparative disadvantage and +1 indicates that there are no imports ($M_{ih} = 0$) which reveals that comparative advantage. RCA can be computed at the various level but the results would be finer if it is disaggregated. Larger the level of disaggregation, it will identify the product in which export potential exit.

Table A.6 show revealed comparative advantage of India in different seeds from 2001 to 2011. India has maintained comparative advantage in all of the seeds except buckwheat in which India has comparative disadvantage. The RCA value is close to one or one in all seeds except buckwheat seed.

Table A.6: Revealed Comparative Advantage Index of India and SAARC Region											
Types of Seed	RCA Index										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seed	0.68	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Fruit Seed	1	0.97	0.83	0.80	0.97	0.98	1	0.98	1	1	0.94
Oil Seed	1	1	0.86	1.00	1.00	0.92	1.00	0.98	0.41	0.85	0.98
Wheat Seed	-	-	1	1	1	1	1	1	-	-	1
Rice Seed	-	-	1	1	1	1	1	1	1	1	1
Maize Seed	1	1	1	1	1	1	1	1	1	1	1
Grain Sorghum Seed	-	-	1	1	1	1	1	1	1	1	1
Barley Seed	-	-	1	-	-	1	1	1	-	1	-
Buckwheat Seed	-	-	-1	-0.71	-1	-1	-0.81	-1	-1	-1	-0.97

Source: ITC Trade Map, 2012-13

Note: (-), indicate that country has not traded the seeds during the periods

Table A.7 shows that other SAARC countries have revealed comparative disadvantage in eight seed out of the nine seed traded with India. RCA value of eight seed except buckwheat seed possess negative value throughout the period 2001-11. This negative value shows that other SAARC countries have disadvantage in export of these seed to India. The SAARC region has comparative advantage in buckwheat seed supply to India.

The above results provide useful information for the nature and extent of RCA in India and SAARC region. India appears to have comparative advantage in eight seed except one, namely buckwheat seed.

Table A.7: Revealed Comparative Advantage Index of SAARC Region and India											
Types of Seed	RCA Index										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vegetable Seeds	-0.7	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Fruit Seed	-1.0	-1.0	-0.8	-0.8	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-0.9
Oil Seed	-1.0	-1.0	-0.9	-1.0	-1.0	-0.9	-1.0	-1.0	-0.4	-0.8	-1.0
Wheat Seed	-	-	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-	-	-1.0
Rice Seed	-	-	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Maize Seeds	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Grain Sorghum Seed	-	-	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Barley Seed	-	-	-1.0	-	-	-1.0	-1.0	-1.0	-	-1.0	-
Buckwheat Seed	-	-	1.0	0.7	1.0	1.0	0.8	1.0	1.0	1.0	1.0

Source: ITC Trade Map

Note: (-), indicate that country has not traded the seeds during the periods

Annexure 4: Revealed Comparative Advantage Index of India with Four Countries in Different Seeds

Vegetable Seed											
Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bangladesh	1	0.99	1	1	1	1	1	1	0.96	1	0.97
Pakistan	0.59	1.00	0.99	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Nepal	1	-	0.94	1	1	1	1	1	1	1.00	0.89
Sri Lanka	1	1	1	1	1	1	1	1	1	1	1

Fruit Seeds											
Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bangladesh	1	1	1	1	1	1	1	1	1	1	0.91
Pakistan	1	0.94	0.45	0.10	0.75	0.37	1.00	0.89	1	1	1
Nepal	1	-	1	1	-	1	1	1	1	1	1
Sri Lanka	1	1	1	1	1	1	1	1	1	1	1

Oil Seed											
Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bangladesh	1	-	1	1	1	1	-0.52	1	0.93	1	-
Pakistan	-0.12	0.02	0.30	0.48	-0.91	0.50	-1.00	-0.86	-0.70	-0.60	-0.06
Nepal	1	1	0.99	1	1	1	1	1	1	1	1
Sri Lanka	1	1	1	1	1	-0.20	1	1	1	1	1

Wheat Seed											
Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bangladesh	-	-	1	1	1	1	-	1	-	-	1
Pakistan	-	-	-	-	-	1	-	-	-	-	-
Nepal	-	-	1	1	1	1	1	1			1
Sri Lanka	-	-	1	-	1	1	-	-	-	-	-

Rice Seed											
Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bangladesh	-	-	1	1	1	1	1	1	1	1	1
Pakistan	-	-	-	-	-	-	-	-	1	1	-
Nepal			1	1	1	1	1	1	1	1	1
Sri Lanka	-	-	1	1	-	-	-	-	-	-	1

Maize Seed											
Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bangladesh	1	1	1	1	1	1	1	1	1	1	1
Pakistan	-	-	1	1	1	1	1	1	1	1	1
Nepal	-	1	1	1	1	1	1	1	1	1	1
Sri Lanka	-	-1	1	1	1	1	1	1	1	-	-

Source: ITC Trade map, 2012-13

Note: (-) Indicate that trade did not occur during this period.

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. It is implemented in Bangladesh and 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 High Yielding Varieties (HYV) rice seeds between India and Bangladesh.

The objectives are to:

- understand factors that drive demand and flow of HYV rice seeds in Eastern Indian States and Bangladesh;
- identify varieties with bilateral trade potential;
- understand systemic enabling factors and challenges to bilateral knowledge-sharing and trade of seeds between India and Bangladesh, particularly on HYV rice seeds; and
- facilitate formalisation and expansion of bilateral trade and knowledge-sharing on HYV rice seeds varieties between Bangladesh and India

About CUTS

With its headquarters in Jaipur, India, Regional Centres in Lusaka, Nairobi, Accra and Hanoi and an International Centre in Geneva, the organisation has established its relevance and impact in the policy-making circles and among the larger development community in the developing world and at the international level on cognate subjects of Governance, Regulations and Trade.



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ISBN 978 81 8257 204 1



9 788182 157204 1

₹250/US\$25