



Access to Seeds
Index

Identifying Leading Seed Companies in South and Southeast Asia



**Landscaping study for the
Regional Access to Seeds Index
for South & Southeast Asia**

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Introduction

The Regional Access to Seeds Index for South & Southeast Asia will evaluate the efforts of 24 leading seed companies in the region, aimed at improving access to seeds for smallholder farmers. Improving smallholder farmer productivity is one of the main targets on the United Nations' Sustainable Development Goals agenda. By providing clarity on leadership and good practices in the industry, the Access to Seeds Index aims to contribute to achieving these goals.

This list of 24 companies is the result of a process of research, consultations and validation, which started with studies of the seed industry in 13 countries in the region by Mordor Intelligence: Afghanistan, Bangladesh, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand and Vietnam.

The final selection of companies was based on the following set of criteria: (1) having an integrated seed business model; (2) regional presence or at least a regional influence; (3) physical presence and business activities in the region and (4) peer recognition as a leading company. Seed volumes and revenues were considered where possible to determine size and dominance in each country or multiple countries. The studies and company selection was discussed and approved by a regional expert review committee, which convened in Hyderabad on 24 October 2017.

This landscaping report provides an overview of the outcomes of the country studies. In addition, the report summarizes the main seed industry players; main crops of the region covering staple, vegetable, local and non-food crops; the enabling environment; certain challenges that smallholder farmers contend with in the region; and opportunities for future development of the seed sector.

Companies selected for the Regional Access to Seeds Index for South & Southeast Asia

	Company	Country
1	Acsen HyVeg	IND
2	Advanta	ARE
3	Bayer	DEU
4	Bioseed	IND
5	BRAC	BGD
6	Charoen Pokphand	THA
7	DowDuPont	USA
8	East-West Seed	THA
9	Groupe Limagrain	FRA
10	Kalash Seeds	IND
11	Known-You Seed	TWN
12	Lal Teer Seed	BGD
13	Mahyco	IND
14	Monsanto	USA
15	Namdhari Seeds	IND
16	National Seeds Corporation	IND
17	Nongwoo Bio	KOR
18	Nuziveedu Seeds	IND
19	Punjab Seed Corporation	PAK
20	Rallis/Metahelix	IND
21	Sakata	JPN
22	Syngenta (ChemChina)	CHE
23	Takii	JPN
24	Vinaseed	VNM

1. Landscaping the Seed Sector in South and Southeast Asia

1.1 Background

This seed industry landscaping study for South and Southeast Asia assesses the feasibility of a special regional Access to Seeds Index. The study covers 13 South and Southeast Asian countries, namely, Afghanistan, Bangladesh, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand and Vietnam. While South Asia and Southeast Asia are sometimes considered different geographical regions, the analyses of crops and seed companies did show some, but not major, differences.

Among the various issues that smallholder farmers face, access to quality seeds is a major issue in these regions due to limited access to markets, knowledge, and limited financial capital, among other things. The main drawbacks for a vibrant private seed sector for many countries in South and Southeast Asia are outdated seed laws and strict regulatory bureaucracy. The laws are variable for the countries within the study.

State and publicly-owned seed companies have a significant presence in this region, while the private seed sector is increasing its market share. However, subsidized cost structures offered by the state and publicly-owned firms are difficult to compete with, hindering private seed sector growth and investment in private seed production and marketing. Nevertheless, for the development of agricultural production, favorable policies are needed to ensure the growth of the private seed sector.

The main staples in the region are rice and maize; the main vegetables are chilies, onion and tomato. Oilseeds for cooking oil and pulses are important local crops, with cassava – more for feed than for food – being especially important in Southeast Asia. Cotton, tobacco and jute are the most important non-food crops in the region. Most of the countries in the region are beginning cultivation of GM crop varieties. Transgenic varieties of non-food crops such as cotton are cultivated in India, Myanmar and Pakistan, while transgenic varieties of food plants such as maize, tomato and/or eggplant are grown in Bangladesh, the Philippines and Vietnam. Most of the other countries in the region, except for Cambodia, Thailand and Indonesia, have legislation that permits experimental cultivation of GM crop materials. However, these countries may not be cultivating GM crops yet, or are faced with opposition from the general public, as is the case in Nepal.

All countries are moving toward being compliant with TRIPS (Trade-Related Aspects of Intellectual Property Rights), and some have joined or are joining the International Union for the Protection of New Varieties of Plants (UPOV) as part of their commitment to plant breeders' rights. At present, among the 13 countries covered in this study, Vietnam is the only member of UPOV. India and the Philippines have initiated procedures for becoming UPOV members. Cambodia, Myanmar, Pakistan and Thailand are in contact with UPOV for assistance in the development of similar laws.

1.2 The Seed Sector in South and Southeast Asia

The countries studied in the South Asian seed industry include Afghanistan, Bangladesh, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam and are presented below from west to east.

Global multinational companies, such as Monsanto, Syngenta (ChemChina), and DowDuPont, play an important role in the seed sector across the region. Several companies from Asia but not from the region, such as Nongwoo Bio (Korea) and Known-you Seed

(Taiwan), were found throughout the region to be important as well. A range of companies from within the region, in particular from countries with a well-developed enabling environment for the seed sector, such as India (Advanta, Bioseed) and Thailand (Charoen Pokphand, East-West Seed) also operate across the region. Even some of the companies that are state-owned – and still play a major role in the region – export seed, such as the National Seeds Corporation (India) and the Punjab Seed Corporation (Pakistan).

Afghanistan

In the seed sector of Afghanistan, the informal seed sector dominates the market while the formal seed sector mainly focuses on wheat seed.

Pakistan

The Seed (Truth-in-Labeling) Rules 1991 stimulated import and export of seeds, and has also attracted many national and multinational companies to operate in Pakistan. There are no restrictions on the private sector selling commercially-viable crop seeds in Pakistan.

India

The Indian seed industry is one of the most mature seed industries in the region; both the private and public sector play an equally important role in seed production and distribution. The private sector has the majority share of the seed market, and is heterogeneous in terms of company size, product portfolios and research capacity. The private sector in India is growing due primarily to an increased investment in R&D, acceleration in the use of hybrid seeds with various technological components such as seed treatments and rising international trade.

Nepal

Private seed companies, village-based small seed enterprises (SSEs), agrovets, cooperatives, and groups organized by the Department of Agriculture's Crop Development Directorate, along with the National Seed Corporation, are important players in the Nepal seed industry.

Sri Lanka

Almost 90% of farmers in Sri Lanka use rice seed produced on-farm or obtained from neighboring farmers, through an informal seed supply system. Very few smallholder farmers have access to formal seeds. Lack of knowledge about seed quality is the main problem of smallholder farmers in Sri Lanka. Very few international seed companies are active in the country.

Bangladesh

The public domain dominates plant breeding activities in Bangladesh's seed industry. Due to a growing demand for provisioning good quality seeds and varieties adapted to local growing conditions, NGOs and private companies alike are getting involved in plant breeding and seed production.

Myanmar

The Myanmar seed industry has great potential, owing to its strategic position and proximity to major markets in the region, such as China, Bangladesh and Thailand. Vegetables constitute an important and often primary source of income for almost 750,000 smallholder farmers. While most of the seed industry in the country is still dominated by the public sector, several international and regional companies are developing a presence in the country.

Thailand

The Thai seed industry is among the most advanced and well-developed in Asia-Pacific. At present, Thailand is an attractive hub for seed production in Asia-Pacific due to suitable geography and weather; availability of highly trained plant scientists; a wide diversity of germplasm; proper infrastructure; government support; investments from foreign governments in the seed sector; and the presence of multinational agencies and companies. Major international seed companies such as East-West Seed and Charoen Pokphand (Chia Tai) are headquartered in Thailand.

Laos

The seed sector in Laos is underdeveloped. Most of the seed production and breeding is controlled by government entities. For rice seed, there are farmers' multiplication groups, and one public agency called the Rice Seed Multiplication Centre. Seeds are being imported from Thailand and Vietnam.

Cambodia

State-owned Cambodian Agricultural Research and Development Institute (CARDI) and AQIP Seed Company, and a few small-scale private producers who work directly under the Ministry of Agriculture, constitute the formal seed sector of Cambodia. The major constraints for seed production supply in Cambodia are a limited development of new varieties and their subsequent release; lack of mechanized equipment and facilities; and lack of capital for the seed industry. Additionally, due to the country's hot and humid climate, seed deterioration in both field production and storage phases constitutes a major problem.

Indonesia

Indonesia is considered a competitive seed production hub. The government encourages sharing knowledge about the latest seed technology through partnerships, while encouraging trade agreements to cover transfer of technology in agriculture through business practices. Notable is the prominent presence of Northern Asian multinational seed companies, from South Korea and Japan, in the seed sector in Indonesia.

Vietnam

In Vietnam, almost 70-80% of the formal seed sold – including hybrid rice, maize, and vegetable seed – is imported. Hybrid rice seed is imported mostly from China; hybrid maize from Thailand and India; and vegetable seed from Thailand, China, Japan, South-Korea, and France. With the maize seed market now dominating Vietnam's formal seed industry, the country is witnessing significant developments regarding advanced breeding technologies and the introduction of biotech traits.

Philippines

In the Philippines, the largest hybrid vegetable seed producer is East-West Seed, which accounts for nearly 70-75% of the local market and a major portion of the total seed market. The Philippines is one of the most prolific users of hybrid rice seed in the region, produced by companies such as Syngenta (ChemChina).

1.3 Leading Seed Companies in the Region

Four groups of leading seed companies have been identified based on the information gathered per country.

Global seed companies

Eight seed companies with a global presence were identified as leading companies in some of the countries under study and/or were found to be present in several countries in the region.

Regional seed companies

Twelve companies were identified as a lead company in at least one country in the region, but are also commercially active in at least one other country in the region.

Local special interest seed companies

Ten companies were identified as companies or seed enterprises selling seeds exclusively in their own country, but 'stand out from the crowd' for different reasons, and, which may be of interest for inclusion in the Regional Access to Seeds Index for South & Southeast Asia.

Government owned companies

The last group of leading companies is state-owned. Most are active only in their own country, except the National Seeds Cooperation of India, and the Punjab Seed Corporation of Pakistan.

Out of these companies, 24 companies have been selected to be included in the first Regional Access to Seeds Index for South & Southeast Asia. Companies were selected that meet the following criteria (1) having an integrated seed business model, including, breeding, production and marketing and sales; (2) regional presence or at least regional influence; (3) physical presence and business activities in the region and (4) peer recognition as a leading company.

Although two companies, Sakata and Takii, were not found to have a leading position in any of the countries, the Expert Review Committee (ERC) that reviewed the study and selection process advised that they should be selected for the regional index based on their leading position in the whole Asian region.

Global seed companies in South and Southeast Asia

Company	HQ	Leading in	Active in	Crops		Business		
				Staple	Vegetable	Breeding	Seed production	Marketing & sales
Bayer	DEU	MMR	PAK, IND, BGD, THA, VNM, PHL, IDN, MMR, LAO	●	●	●	●	●
DowDuPont	USA	IND, PAK, THA, PHL, IDN	KHM, IND, PAK, THA, PHL, IDN, VNM	●		●	●	●
East-West Seed	THA	IDN, MMR, THA, VNM, KHM, PHL	AFG, PAK, IND, NPL, BGD, MMR, THA, VNM, LAO, KHM, IDN, PHL		●	●	●	●
Groupe Limagrain	FRA	IND	KHM, MMR, IND, IDN, BGD, LKA, THA	●	●	●	●	●
Monsanto	USA	IND, IDN, PAK, THA, PHL, VNM	BGD, IND, IDN, MMR, PAK, PHL, THA, VNM	●	●	●	●	●
Sakata	JPN	-	IND, THA, MMR, IDN		●	●	●	●
Syngenta (ChemChina)	CHE	BGD, PAK, PHL, THA, VNM, LAO	BGD, IND, IDN, PAK, PHL, THA, VNM, LAO	●	●	●	●	●
Takii	JPN	-	IND, IDN, THA, PAK		●	●	●	●

Regional seed companies in South and Southeast Asia

Company	HQ	Leading in	Active in	Crops		Business		
				Staple	Vegetable	Breeding	Seed production	Marketing & sales
Acsen HyVeg	IND	IND	PHL, LKA, VNM, BGD, IND	●	●	●	●	●
Advanta	ARE	IND, IDN, THA, LAO	BGD, IND, IDN, NPL, PAK, LKA, KHM, THA	●	●	●	●	●
Bioseed	IND	IND, PHL, VNM	IDN, PHL, VNM, IND	●	●	●	●	●
Charoen Pokphand	THA	MMR, THA, IDN, VNM	IND, IDN, KHM, MMR, THA, VNM	●	●	●	●	●
Kalash Seeds	IND	IND	BGD, IND, NPL, PAK, LKA	●	●	●	●	●
Known-You Seed	TWN	MMR, THA, LAO	IND, IDN, MMR, PHL, THA, VNM, LAO	●	●	●	●	●
Lal Teer Seed	BGD	BGD	IND, PAK, VNM		●	●	●	●
Mahyco	IND	IND	KHM, IND, IDN, VNM	●	●	●	●	●
Namdhari Seeds	IND	IND, THA	IND, IDN, MMR, THA, VNM	●	●	●	●	●
Nongwoo Bio	KOR	IDN	IND, IDN, PAK		●	●	●	●
Nuziveedu Seeds	IND	IND	IND, BGD, PAK, VNM	●	●	●	●	●
Rallis/Metahelix	IND	IND	IND, IDN	●		●	●	●
Vinaseed	VNM	VNM, LAO	VNM, KHM, LAO	●	●	●	●	●

Local special interest seed companies

Company	HQ	Crops		Business		
		Staple	Vegetable	Breeding	Seed production	Marketing & sales
Advanced Chemical Industry (ACI)	BGD	●	●	●	●	●
BRAC	BGD	●	●	●	●	●
Evogene Seed	PHL	●		●	●	●
Hayleys Agriculture	LKA	●	●	●	●	●
Jullundhar	PAK	●	●	●	●	●
Myanma Awba	MMR	●	●	●	●	●
Southern Seed	VNM	●	●	●	●	●
Supreme Seed	BGD	●	●	●	●	●
TroSeed	LKA		●	●	●	●
Unique Seed	NPL	●	●	●	●	●

Government-owned seed companies

Company	HQ	Additional countries	Crops		Business		
			Staple	Vegetable	Breeding	Seed production	Marketing & sales
Aqip Seed Company	KNM	-	●		●	●	●
CARDI	KHM	-	●	●	●	●	●
National Seed Company	NPL	-	●	●	●	●	●
National Seeds Corporation	IND	SAARC, VNM	●	●	●	●	●
Punjab Seed Corporation	PAK	AFG, BGD, MMR	●	●	●	●	●

Overview of identified leading seed companies per country

- Companies selected for the 2019 Access to Seeds Index
- Companies that did not meet the selection criteria

1. Afghanistan
- Helal Group
 - Noor Agro Group

2. Pakistan
- **Monsanto**
 - Jullundur Seed
 - **Syngenta (ChemChina)**
 - **Punjab Seed Corporation**
 - ICI Pakistan
 - **DowDuPont**
 - Ali Akbar Group
 - Four Brothers Group
 - Auriga Seeds

3. India
- **Nuziveedu Seeds**
 - Kaveri Seeds
 - **National Seeds Corporation**
 - **DowDuPont**
 - **Mahyco**
 - **Monsanto**
 - **Bioseed**
 - **Acscen HyVeg**
 - **Rallis/Metahelix**
 - JK Agri Genetics
 - VNR Seeds
 - **Advanta**
 - **Namdhari Seeds**
 - **Kalash Seeds**
 - **Groupe Limagrain**

4. Nepal
- National Seed Company
 - National Seed Company Private Limited
 - Lumbini Seed
 - Unique Seed
 - Annapurna Seeds

8. Thailand
- **Monsanto**
 - **Charoen Pokphandi**
 - **Syngenta (ChemChina)**
 - **Advanta**
 - **DowDuPont**
 - **East-West Seed**
 - **Known-You Seed**

12. Indonesia
- **Charoen Pokphand**
 - **DowDuPont**
 - **East-West Seed**
 - **Monsanto**
 - **Advanta**
 - **Nongwoo Bio**
 - **Bioseed**

5. Sri Lanka
- Troseeds
 - Best Seeds
 - CIC Agri Business
 - Hayleys Agriculture
 - Lankem Ceylon Plc-Agro
6. Bangladesh
- **BRAC**
 - **Lal Teer Seed**
 - Advanced Chemical Industries (ACI)
 - Supreme Seed
 - **Syngenta (ChemChina)**
 - Bangladesh Agricultural Development Corporation (BADC)
7. Myanmar
- **East-West Seed**
 - **Charoen Pokphand**
 - **Known-You Seed**
 - **Bayer**
 - Myanmar Awba
 - Dagon Agricultural Group

9. Laos
- **Syngenta (ChemChina)**
 - **Known-You Seed**
 - **Advanta**
 - **Vinaseed**
 - Green Seeds

10. Cambodia
- CARDI
 - AQIP Seed Company
 - **East-West Seed**

11. Vietnam
- **Vinaseed**
 - **Charoen Pokphand**
 - Southern Seed
 - **Bioseed**
 - **Monsanto**
 - **Syngenta (ChemChina)**
 - **East-West Seed**
 - Trang Nong Seeds
 - Thai Binh Seeds

13. Philippines
- **DowDuPont**
 - **Syngenta (ChemChina)**
 - **Monsanto**
 - **Bioseed**
 - Evogene Seeds
 - **East-West Seed**
 - Ramgo International
 - Vigour Seeds
 - Kaneko Seeds
 - S L Agritech
 - Harvest Agribusiness

Disclaimer: Country borders or names do not necessarily reflect the Access to Seeds Foundation's official position. Maps used are for illustrative purposes and do not imply the expression of any opinion on the part of the Foundation, concerning the legal status of any country or territory or concerning the delimitation of frontiers or boundaries.

1.4 Main Crops in South and Southeast Asia

Main crops in all 13 countries have been identified based on average data of area harvested from 2010 to 2014, by analyzing crops in four categories, i.e. staple, vegetable, local and non-food crops per country. In the table below, the order is based on frequency of the crop being listed as a main crop for the 13 countries in the region. For instance, rice is cultivated in all the 13 countries, so it is placed first in the list of staple crops. Crops that were only identified in one country as a main crop are not included in this table.

Main crops in South and Southeast Asia

Staple crops	Vegetable crops	Local crops	Non-Food crops
Rice	Chilies & peppers	Groundnut	Tobacco
Maize	Onion	Sesame	Cotton
Beans, dry	Tomato	Cassava	Jute
Potatoes	Watermelon	Sweet potato	Castor
Soybean	Cabbage & brassicas	Chick pea	
Wheat	Pumpkin, squash & gourds	Mustard	
Millet	Eggplant	Sunflower	
Sorghum	Garlic	Pigeon pea	
		Lentil	

1.5 Methodology

The study of the seed sector has been conducted based on secondary desk research from various government websites, government publications, publications from industry associations, research papers, publications of various seed surveys, seed company websites and annual reports.

In the primary research phase, various industry experts and companies were contacted as part of the data collection process. While some companies have obliged, several others have shown reluctance to provide information.

The major companies operating in each country have been identified using a triangular validation method. First, authentic sources such as seed association publications and government websites have been referenced. Second, revenue information from annual reports, if available, have been used, as well as databases such as Dow Jones Factiva, to which Mordor Intelligence had access. In addition to these two sources, various industry experts in the region were contacted as well as experts from the country. Based on information taken from these three sources, leading companies per country have been identified, both public and private.

The main annual herbaceous crops in each country have been identified based on area harvested. The area harvested between 2010 – 2014 was collected from FAO;¹ an average of four years was taken to determine the main five crops in each country in each category. For some countries, fewer than five crops for some of the categories are listed, further crops in that category being insignificant in acreage.

In each country, the crops have been segmented into staple crops, vegetable crops, local crops and non-food crops, limited to annual herbaceous crops that require regular reseeded or replanting, and hence, are of potential

significance within the seed industry. The crops presented under staple crops are aligned with the list that is used for global field crops in the first Access to Seeds Index methodology and report. A similar procedure has been followed for the vegetable crop category.

Local crops encompass all other crops relevant for food and nutrition. Non-food crops are those that have no direct food use and/or require industrial processing before use. Some of these crops are major sources of revenue for seed companies.

The studies and company selection was discussed and approved by a regional expert review committee which convened in Hyderabad on 24 October 2017.

Regional Expert Review Committee for South and Southeast Asia

1. Vinich Chuanchai, advisor of the Thai Seed Trade Association
2. Ram Kaundinya, former CEO and Managing Director, Advanta
3. Amirul Islam, Operations Manager with the Asian Farmers Association for South and Central Asia
4. Ajay Vir Jakhar, Chairman of Bharat Krishak Samaj (Farmers' Forum)
5. Orachos Napasintuwong, Assistant Professor, Agricultural and Resource Economics, Kasetsart University in Bangkok, Thailand.
6. Umashankar Singh, scientist at the International Rice Research Institute (IRRI) in India.

Seed Sector Study of South and Southeast Asian Countries

Identify data sources

Primary sources

- Seed & agriculture researchers
- Company sales managers
- Company board members
- Industry experts
- Government officials

Secondary sources

- Company reports and websites
- Research journals
- Market research reports
- Government publications
- Seed association publications

Data collection

Interviews and response coding

Secondary data analysis

Data analysis

- Landscape national seed sectors
- Identify top crops based on area harvested
- Identify the major seed companies
- Inventory business activities of major seed companies

Validation

- Expert review committee meeting
- Additional expert input

Study outcomes

- Overview seed industry landscape South and Southeast Asia
- Country profiles with major seed companies and crops

2. Country profiles

Country specific profiles provide an overview of the seed sectors as well as a list of leading seed companies in the respective countries. Information has been sourced from existing literature and interviews with international, regional and national seed sector players in each country.



2.1	Afghanistan	12
2.2	Pakistan	13
2.3	India	15
2.4	Nepal	17
2.5	Sri Lanka	18
2.6	Bangladesh	19
2.7	Myanmar	20
2.8	Thailand	21
2.9	Laos	22
2.10	Cambodia	23
2.11	Vietnam	24
2.12	Indonesia	25
2.13	Philippines	26

2.1 Afghanistan

The main seed companies of Afghanistan have been identified based on (limited) secondary sources and correspondences with Hazrat Wali, managing director, and, Mohammad Bilal Gulab, office and marketing manager, both representing Helal Group, a major seed company in Afghanistan.²



Main seed companies in Afghanistan

Seed companies	Crops sold in Afghanistan				Business model			Afghanistan revenue (USD mln) 2016
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
Helal Group	•	•			•	•	•	5
Noor Agro Group	•	•				•	•	NA

Main crops in Afghanistan

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Wheat	2653746	Melon	22722	Sesame	13508	Cotton	35000
Barley	342472	Watermelon	19835	Linseed	4213		
Rice	220000	Fresh vegetables (nes)	63611	Pulses (nes)	79746		
Maize	127000						
Potato	25009						

Seed companies in Afghanistan are local and small. The Helal Group is recognized as the lead seed company in Afghanistan. Helal is importing seeds and varieties from various branded global seed producers (such as East-West Seed, Chia Tai/Charoen Pokphand, Vilmorin/Groupe Limagrain and Sakata). Helal is also engaged in local R&D and in seed production by farmers. A second relevant company is Noor Agro Group.

The key public sector players in Afghanistan are the Agricultural Research Institute of Afghanistan (ARIA) and Improved Seed Enterprise (ISE). ARIA is involved in breeder seed production of released varieties and ISE produces foundation and registered seed, which are subsequently sold to private seed enterprises.

International organizations important in the seed sector include the International Maize and Wheat Improvement Center (CIMMYT), the International Center for Agricultural Research in the Dry Areas (ICARDA), the Australian Centre for International Agricultural Research (ACIAR) and Food & Agriculture Organization (FAO).

Wheat is the major staple crop in Afghanistan, followed by barley, rice, maize and potato. Melon and watermelon are widely grown vegetables. Numerous other vegetables are also grown; however, no crop specific acreage or production data are available.

Important local crops include sesame, linseed, and pulses (bean, chickpea, and mung bean). Cotton is an important non-food crop.³

The informal seed sector, which includes farm-saved seeds and leaked seeds (unlabeled and untested seeds) dominates in Afghanistan. The formal seed sector mainly focuses on wheat, for which there is an increased availability of improved varieties.

Illegal seeds are provided to the Afghan farmers by many Iranian and Pakistani companies. According to CGIAR sources, the development of village-based seed enterprises (VBSEs) will create opportunities for the smallholder farmers in Afghanistan to obtain improved seed, due to the role they can play in providing good quality adapted varieties and in reducing cost of seed transportation.

2.2 Pakistan

The main seed companies of Pakistan have been identified based on (limited) secondary sources and correspondences with seed company representatives and Faisal Hayat, Deputy General Manager at Jullundur Seed.⁴



Main seed companies in Pakistan

Seed companies	Crops sold in Pakistan				Business model			Pakistan revenue (USD mln) 2016
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
Monsanto	•	•		•	•	•	•	NA
Jullundur Seed	•		•	•	•	•	•	10 (2015)
Syngenta (ChemChina)	•	•		•	•	•	•	38
Punjab Seed Corporation	•	•	•	•	•	•	•	NA
ICI Pakistan	•	•	•		•	•	•	187
DowDuPont	•		•		•	•	•	NA
Ali Akbar Group	•	•	•	•	•	•	•	NA
Four Brothers Group	•	•	•	•	•	•	•	NA
Auriga Seeds	•	•	•	•	•	•	•	NA

Main crops in Pakistan

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Wheat	9199318	Onion	133922	Chick pea	949513	Cotton	2961263
Rice	2890646	Chilies & peppers, dry	62742	Mustard	235711	Tobacco	49040
Maize	1142462	Tomato	62930	Sunflower	152675		
Millets	461901	Watermelon	36809	Groundnut	96258		
Sorghum	194773	Pumpkin, squash & gourds	25843	Pulses (nes)	197100		

The informal sector is the major seed supplier in Pakistan. More than 90% of the seed is farm-saved seed, although also sold through commissioned agents, retailers, and shopkeepers.

The informal sector provides approximately 23% of vegetable seeds, 45% of cotton seeds, 90% of wheat, rice, and maize, and almost 99% of the pulses, to smallholder farmers. With the government no longer controlling seed prices, seed sold by the private sector is more expensive than that sold by the public sector. Imported seed is much more expensive than that produced locally. Price is a major constraint for most smallholder farmers in Pakistan.

The Government of Pakistan has research ties with various international organizations, such as, the International Maize and Wheat Improvement Center (CIMMYT) and FAO, to promote R&D in various crops of interest. As per primary interviews, multinationals have larger footprints in

hybrid seeds of maize, sunflower, vegetables, sorghum, etc., whereas local companies have larger shares in cotton, rice, wheat, etc.

For maize, Monsanto, DowDuPont, and Syngenta (ChemChina) are the important seed contributors, while important contributors for vegetable seed include Seminis/ Monsanto, Syngenta (ChemChina), ICI, and to a lesser extent East-West Seed, Nongwoo Bio, and Takii. For crops, such as, rice, cotton and wheat, the significant contributors are Jullundur Seed, Four Brothers Group, Ali Akbar Group, Punjab Seed Corporation, and Auriga Seed, among others. Other national companies, such as Rashid Seeds and Sky seeds, are comparatively smaller.

Provincial seed corporations are responsible for marketing and distributing seeds to smallholder farmers, through their own seed depots, seed dealers, and other public sector organizations. The Punjab Seed Corporation is the largest

among these. However, in Baluchistan, seed is sold directly to the farmers by agricultural extension services, established by the Department of Agriculture.

The Government of Pakistan considers wheat as a key strategic commodity. It occupies a vast harvest area and is an important staple crop. Rice is the most important food and cash crop, followed by maize, millets, and sorghum, the latter being mainly grown for feed purposes. Onion, chilies & peppers, tomato, watermelon, and pumpkins, squashes & gourds are the major vegetable crops of the country.

Among local crops, chickpea, mustard, sunflower, pulses (such as mung beans, black grams, and lentils), and groundnuts are important. Cotton and tobacco are important non-food crops.

2.3 India

The main seed companies of India have been identified based on secondary sources, revenues and primary information received from industry experts and discussions with Mordor's advisor Mr. Mangesh Kadgaonkar, who has worked for 25 years with Syngenta (ChemChina) in various positions, in the plant protection and seed divisions.⁵



Main seed companies in India

Seed companies	Crops sold in India				Business model			India revenue (USD mln)
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
Nuziveedu Seeds	•	•	•	•	•	•	•	185 (2014)
Kaveri Seeds	•	•	•	•	•	•	•	137 (2016)
National Seeds Corporation	•	•	•	•	•	•	•	125 (2016)
DowDuPont/Phi Seeds	•		•		•	•	•	124 (2015)
Mahyco	•	•	•	•	•	•	•	115 (2015)
Monsanto	•	•		•	•	•	•	99 (2016)
Bioseed	•	•		•	•	•	•	66 (2016)
Acsen HyVeg	•	•	•		•	•	•	NA
Rallis/Metahelix	•		•		•	•	•	44 (2016)
JK Agri Genetics	•	•	•	•	•	•	•	30 (2016)
VNR Seeds	•	•	•	•	•	•	•	22 (2015)
Advanta	•	•	•	•	•	•	•	21 (2016)
Namdhari Seeds	•	•	•	•	•	•	•	19 (2013)
Kalash Seeds	•	•	•	•	•	•	•	17 (2015)
Groupe Limagrain	•	•			•	•	•	17 (2016) ^a

Main crops in India

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	43855000	Onion	1203570	Chick pea	9927000	Cotton	13083000
Wheat	30470000	Tomato	882030	Mustard	6645740	Castor	1040000
Soybean	10908000	Chilies & peppers, dry	775000	Groundnut	4685000	Jute	741000
Millet	8904000	Eggplant	711310	Pigeon pea	5602000	Tobacco	432679
Dry beans	10000000	Okra	532660	Pulses (nes)	2250000		

The Indian seed industry is advanced, with both the private and public sector playing important roles in seed production. The Indian Council for Agricultural Research (ICAR) and the State Agricultural Universities (SAUs) have a long tradition developing improved crop varieties and hybrids. Seed production of these materials for commercial purposes is carried out by public seed agencies like the National Seeds Corporation (NSC), State Farms Corporation of India and State Seeds Corporations (SSCs). Agricultural subsidies in the form of (a) investment subsidies and (b) input subsidies are prevalent in India.

The private sector is heterogeneous and holds the primary market share. The increasing investments in R&D, plant breeding, increase in the use of hybrid seeds in combination with various technological components (such as seed treatment etc.), and growing international trade, are some of the reasons for growth in the private sector.

The private sector comprises of important national companies including Nuziveedu Seeds, Kaveri Seeds, Mahyco, Bioseed, Acsen HyVeg, Rallis/Metahelix, JK Agri Genetics, VNR Seeds, Namdhari Seeds and Kalash Seeds.

Also multinational companies such as DowDuPont, Monsanto, Groupe Limagrain and Advanta play an important role. Several other multinational companies have offices in India, including Sakata and Takii, although these are not recognized as main companies. The National Seeds Corporation of India is playing a crucial role in the production and distribution of seeds to smallholder farmers.

Rice, wheat, soybean, millets and dry beans, constitute the most important staple crops of India. Among vegetables, onion, tomato, chilies & peppers, eggplant, and okra occupy a significant area of harvest and constitute the main five vegetable crops of the country.

India is the largest chickpea, pigeon pea and dry pulse producer in the world. The country is also the third largest rapeseed-mustard producer, and has a significant area of harvest allotted to groundnut cultivation. Hence, these crops are the important local crops. Non-food crops, such as cotton, castor, jute and tobacco, have commercial importance in India.

The majority of seeds used by smallholder farmers in India are saved seeds from previous seasons. It has been stated that some of the interventions required to ensure access to the best quality seeds for farmers are implementing farmer seed self-reliance programs through the “Beej Swavlamban Yojana”, which will facilitate decentralized seed production and distribution, encouraging farmers in practicing farmer participatory varietal selection on farm demonstration trials. Investment should be made to help NGOs, farmer cooperatives, community-based organizations (CBOs), Krishi Vignan Kendras (KVKs), among others.

2.4 Nepal

The main seed companies of Nepal have been identified based on (limited) secondary sources in the public domain and seed companies of Nepal have been identified based on communications with Dharmaraj Adhikari (Managing Director, National Seed Company), Laxmikant Dhakal (Chairperson, Unique Seed) and Arun Lal Shrestha (Managing Director, Annapurna Seeds).



Main seed companies in Nepal

Seed companies	Crops sold in Nepal				Business model			Nepal revenue (USD mln) 2016
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
National Seed Company	•	•	•	•	•	•	•	186
National Seed Company Private Limited	•	•				•	•	NA
Lumbini Seed	•					•		NA
Unique Seed	•	•	•		•	•	•	0,5
Annapurna Seeds	•	•	•	•		•	•	NA

Main crops in Nepal

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	1486951	Chilies & peppers, dry	6680	Lentil	205939	Jute	11350
Maize	928761	Garlic	6569	Mustard	173254		
Wheat	754474	Fresh vegetables (nes)	254932	Oilseeds (nes)	207457		
Millet	271183			Roots & tubers (nes)	30052		
Potato	205725			Pulses (nes)	30644		

The Nepal Agricultural Research Council (NARC) is the primary agency responsible for agricultural research. Private-sector companies and NGOs are also involved in agricultural research and extension, albeit on a limited scale. Private seed companies, village-based Small Seed Enterprises (SSEs), agro-vets, cooperatives, and groups organized by the Department of Agriculture's Crop Development Directorate, are the important players in the Nepalese seed industry. The important companies in the country are state owned National Seed Company (NSC), the private (unrelated) National Seed Company, Annapurna Seeds, Unique Seed and Lumbini Seed.

The International Maize and Wheat Improvement Center (CIMMYT), through the Cereal Systems Initiative for South Asia (CSISA), has been working with 10 Nepalese seed companies since 2014, to improve the companies' marketing and sales strategies, business development, product range, and quality. Among these are Lumbini Seed and Unique Seed, which are among the leading seed companies of Nepal.

Rice (paddy) is the staple food crop of Nepal and it accounts for one fifth of the total agricultural GDP of the country. Maize is the second most important staple crop,

followed by wheat, millets, and potato. The top vegetable crops are chilies & peppers, garlic, and other fresh vegetables, such as tomato, cucumber, radish, okra, onion, cowpea, peas, and cress. Lentils are the most important grain legumes in Nepal, accounting for 60% of the overall volume of pulses produced in the country. Mustard seeds, other oilseeds (which include sesame, soybean, linseed, groundnut, and sunflower), roots & tubers (including cassava, yam, and cocoyam), and pulses (which include black gram, broad bean, field pea, grass pea, horse gram, rice bean, and phaseolus bean) are the most important local crops. The most important non-food crop of Nepal is jute.

In Nepal, only about one fifth of the 2.7 million smallholder farms use improved seed, and according to FAO reports, these smallholders use such improved technologies only for a part of their production. The seed system in Nepal includes both informal and formal seed systems, with the formal seed system accounting for less than 10% of the seed supply. However, both systems are interlinked and complement each other for selection and maintenance of preferred varieties.

2.5 Sri Lanka

The main seed companies of Sri Lanka have been identified based on (limited) secondary sources and on discussions with Chaminda Kumara Manage, General Manager of Troseeds. Mr Gavindu Perera from Supreme Marketing also provided information about the company, which is, however, not among the leading seed companies of the country.



Main seed companies in Sri Lanka

Seed companies	Crops sold in Sri Lanka				Business model			Revenue in Sri Lanka (USD mln) 2015
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
Troseeds	•	•				•	•	NA
Best Seeds		•				•	•	NA
CIC Agri Business	•							NA
Hayleys Agriculture	•	•				•	•	607
Lankem Ceylon Plc - Agro	•	•				•	•	NA

Main crops in Sri Lanka

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	881000	Chilies & peppers, green	13115	Cassava	23789	Tobacco	1841
Maize	67159	Eggplant	11616	Sesame	14474		
Dry beans	5842	Pumpkin, squash & gourds	10291	Groundnut	14304		
Millet	5400	Onion	11692	Cowpea	11519		
Potato	5365	Tomato	7335				

Troseeds, Best Seeds (representative of East-West Seed), CIC Agri Business and Hayleys Agriculture (involved in rice) occupy significant positions in the seed sector in Sri Lanka, among other much smaller companies, such as, Lankem Ceylon Plc - Agro and Prima Group.

The main staple food crops of Sri Lanka are rice, maize, dry beans, millets and potato. Among the top vegetable crops, chilies & peppers (dry), eggplant, pumpkin, squash & gourds, onion and tomato occupy a significant position. Cassava, sesame, groundnut and cowpea are important local crops of Sri Lanka, while tobacco is the only non-food crop with a significant area of harvest.

The Sri Lankan government does not have any crop-specific policies relevant for the seed supply of crops. The Rice Research and Development Institute's (RRDI) main role is to bring about self-reliance in rice. The Horticultural Crop Research and Development Institute (HORDI) is responsible for technology development concerning vegetables, fruits, root and tuber crops and floriculture. The institute mainly focuses on the

development of improved crop varieties, new propagation methods, post-harvest and food processing methods. The Field Crops Research and Development Institute (FCRDI) carries out research on cotton, sisal, tobacco and groundnut.

Almost 90% of the farmers in Sri Lanka use rice seed produced by themselves or from neighboring farmers, through the informal seed supply system. Very few smallholder farmers have access to formal seed. Also, lack of knowledge about seed quality is a main problem for smallholder farmers in Sri Lanka.

2.6 Bangladesh

The main seed companies of Bangladesh have been identified based on (limited) secondary sources and discussions with industry experts such as Sudhir Chandra Nath, Head of Business, Advanced Chemical Industries (ACI), and information provided by Md. Arif Hossain, Feed the Future South Asia Eggplant Improvement Partnership Lead from the Bangladesh branch of Alliance for Science.



Main seed companies in Bangladesh

Seed companies	Crops sold in Bangladesh				Business model			Bangladesh revenue (USD mln) 2015
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
BRAC	●	●			●	●	●	725 ⁷
Lal Teer Seed		●			●	●	●	NA
Advanced Chemical Industries (ACI)	●	●			●	●	●	8
Supreme Seed	●	●		●	●	●	●	NA
Syngenta (ChemChina)	●	●	●		●	●	●	NA
Bangladesh Agricultural Development Corporation (BADC)	●	●	●	●		●	●	NA

Main crops in Bangladesh

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	11319490	Onion	150915	Mustard	293920	Jute	665699
Potato	461710	Chilies & peppers	89820	Lentil	124617	Tobacco	50180
Wheat	429770	Garlic	53000	Sesame	34248	Cotton	17000
Maize	307152	Pumpkins, squash & gourds	43300	Groundnut	29560		
Dry beans	18222	Tomato	27114	Pulses (nes)	115627		

Bangladesh Agricultural Development Corporation (BADC) is the largest seed producer and supplier in the country, mandated to produce large quantities of seeds. BADC is also involved in providing technical support to the private sector, NGOs, and farmers, by training & providing services for seed processing.

Agricultural Research Institutes (ARIs) are responsible for developing improved varieties of crops. Most of the plant breeding activities take place in the public domain. However, to meet the growing demand for smallholder farmers for good-quality and better-performing varieties, NGOs and private companies are also getting involved in plant breeding activities.

Lal Teer Seed, Supreme Seed, ACI, and Syngenta (ChemChina) are some of the important private seed sector companies, with significant contributions to the Bangladesh seed sector. Other companies with presence in Bangladesh are Monsanto, Bayer, Groupe Limagrain, East-West Seed, Rijk Zwaan and KWS.

Bangladesh Rural Advancement Committee (BRAC), a non-governmental organization, is also an important organization working on the development of agriculture and the seed sector in Bangladesh.

Rice constitutes the most important staple food crop in Bangladesh, followed by potato, wheat, maize and dry beans. Some of the major vegetables with a significant area of harvest are onion, chilies & peppers (dry), garlic, pumpkin, squash & gourds, and tomato. Mustard, lentils, sesame, groundnut, and pulses are the main local crops while, jute, tobacco and cotton are the significant non-food crops in Bangladesh.

The seed sector of Bangladesh is far from being ideal, as only 25% of the total quantity of seeds used by the smallholder farmers in the country are said to be of good quality, while the remaining are considered inferior quality.

Most of the seeds used by smallholder farmers are sourced from their own saved seed supply and local seed producers, due to the absence of a commercial seed industry. However, with the increasing activity of both public and private seed sector players, the availability of improved seeds to smallholder farmers has improved to some extent.

2.7 Myanmar

The main seed companies of Myanmar have been identified based on (limited) secondary sources and on correspondences with Mr. Tin Maung Shwe, Senior Executive Officer, Agribusiness and Rural Development Consultants, Myanmar. Furthermore, information was received from Mr. Nyi Naing, Corporate Affairs Director at Agro Bio Product, a small seed company in Myanmar.⁸



Main seed companies in Myanmar

Seed companies	Crops sold in Myanmar				Business model			Myanmar revenue (USD mln)
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
East-West Seed		•			•	•	•	NA
Charoen Pokphand	•				•	•	•	NA
Known-You Seed		•			•	•	•	NA
Bayer	•				•	•	•	NA
Myanma Awba	•	•				•	•	NA
Dagon Agriculture Group	•					•	•	NA

Main crops in Myanmar

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	6790000	Chilies & peppers, dry	110000	Sesame	1073200	Cotton	234400
Dry beans	3017250	Onion	77200	Groundnut	484000	Tobacco	16257
Maize	398800	Garlic	28000	Pigeon pea	611600		
Millet	232800	Fresh vegetables (nes)	259899	Sunflower	480643		
Sorghum	210533			Chick pea	384217		

Most seed companies active in Myanmar are involved in seed production and distribution of hybrid maize and vegetables. Some important seed producing companies in Myanmar include East-West Seed, Myanma Awba, Bayer, Charoen Pokphand and Known-You Seed.

Seeds of different staple crops and vegetables are imported in the country through local agricultural trading companies by Monsanto (Thailand), Charoen Pokphand (Thailand), Sakata (Japan), among others. Other global companies having a presence in Myanmar, which includes Groupe Limagrain, Enza Zaden, and Bejo, are currently not recognized as being of major importance.

Mercy Corps, a non-governmental organization, has been operating in Myanmar since 2008 and plays an important role in Myanmar's development, by using the concept of smart subsidies. A public-private partnership has been set up between Mercy Corps and the Livelihoods and Food Security Trust (LIFT) along with East-West Seed. This is known as the 'Making Vegetable Markets Work for Smallholders (MVMWS) Program' to improve information flows and incentives for cooperation, strengthening of market linkages, and building trust on different levels.

Rice is the most important staple crop in Myanmar, followed by beans, maize, millets and sorghum. Maize and sorghum are mainly used for feed and not for food. Chilies & peppers, onion and garlic are important vegetable crops. The other vegetables which are produced in Myanmar are reported together (vegetables nes⁹), and include cabbage, cauliflower, lettuce, tomato, radish, watermelon, bottle gourd, okra, eggplant, squash, cucumber, and cantaloupe. The top local crops include sesame, groundnut, pigeon pea, sunflower seed, and chick pea. In addition, cotton and tobacco¹⁰ are important non-food crops. In Myanmar, vegetables form an important source of income for almost 750,000 smallholder farmers. For more than 35% of the farmers, vegetables are the primary source of income.

Apart from the constraints with respect to policies, the low performance of smallholder farmers is largely due to a lack of knowledge about farming technology and limited access to high-quality seeds. The farmers in Myanmar are primarily dependent on neighbors and input dealers for information related to technical aspects of farming. The major source of vegetable seed is farm-saved seeds.

2.8 Thailand

Main seed companies in Thailand have been identified based on secondary research of statistical databases and discussions with representatives of seed companies in the country.



Main seed companies in Thailand

Seed companies	Crops sold in Thailand				Business model			Thailand revenue (USD mln) 2014
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
Monsanto	●				●	●	●	57
Charoen Pokphand/ Chia Tai	●	●			●	●	●	24
Syngenta (ChemChina)	●				●	●	●	NA
Advanta/Pacific Seeds	●	●			●	●	●	NA
DowDuPont	●				●	●	●	NA
East-West Seed		●			●	●	●	NA
Known-You Seed	●	●			●	●	●	NA

Main crops in Thailand

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	10664923	Green beans	170791	Cassava	1353025	Canary seed	85771
Maize	1131728	Chilies & peppers, dry	72376	Sesame	36821	Tobacco	24665
Dry beans	108740	Cabbage & brassicas	11057	Groundnut	23266		
Soybean	41754	Cucumbers & gherkins	18200	Pulses (nes)	85984		
Sorghum	23740	Watermelon	7512				

The Thai seed industry is considered among the more advanced and well-developed industries in the Southeast Asia. It is the 24th largest seed exporter in the world, and the third largest seed exporter in the Southeast Asia, after Japan and China.

Thailand is an attractive hub for seed production, due to its suitable geography and weather; availability of highly trained plant scientists; wide diversity of germplasm; good infrastructure; government support; and, investments from foreign governments, multinational agencies, and companies in the seed sector.

Multinational companies, such as DowDuPont, Pacific Seeds/Advanta, Syngenta (ChemChina) and Monsanto, who initially relied on the National Corn and Sorghum Research Center (NCSRC, commonly known as 'Suwan Farm'), gradually developed their own varieties. The Thai seed industry has developed considerably, owing to competition between multinational companies.

Among the local companies, the most significant is Charoen Pokphand. Major vegetable seed company Chia Tai is the founder company of the group. Furthermore, Charoen Pokphand is active in maize breeding, which includes collaborative research with Monsanto. East-West Seed, leading in vegetable seeds, moved its headquarters from the Philippines to Thailand. Additional multinational seed companies have offices in Thailand, such as Takii and Sakata, although these are not recognized as main companies in the country.

Rice, maize, dry beans, soybeans, and sorghum are the most important staple crops of Thailand. Green beans, chilies & peppers, cabbage, cucumber & gherkins and watermelon constitute the important vegetable crops. Cassava, sesame, groundnuts, and pulses are the important local crops. The non-food crops with significant area of harvest are canary seed and tobacco. Among all crops, maize has the highest share in total seed exports and imports, in terms of value. Maize is also one of the most advanced seed industries in Thailand, and has integrated both public and private sector in research, development, and marketing.

2.9 Laos

Main seed companies in Laos have been identified based on secondary research of statistical databases and discussions with representatives of seed companies.



Main seed companies in Laos

Seed companies	Crops sold in Lao People's Democratic Republic				Business model			Laos revenue (USD mln) 2016
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
Syngenta (ChemChina)	•				•	•	•	NA
Known-You Seed		•			•	•	•	NA
Advanta/Pacific Seeds	•	•	•		•	•	•	NA
Vinaseed	•	•	•		•	•	•	NA
Green Seeds		•			•		•	NA

Main crops in Laos

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	957836	Chilies & peppers, green	10328	Cassava	60475	Tobacco	6250
Maize	243385	Watermelon	8765	Groundnut	25310		
Soybean	11880	Fresh vegetables (nes)	161379	Sesame	12080		
				Sweet potato	6595		
				Pulses	18058		

The seed sector in Lao People's Democratic Republic (Laos) is underdeveloped. Most of the seed production and breeding is controlled by government bodies. There are farmers' multiplication groups, and the Rice Seed Multiplication Centre (public agency) for rice seed. Other industrial and vegetable seeds are imported from Thailand and Vietnam.

Some important companies that are exporting seeds from Thailand to Laos include Syngenta (ChemChina), Known-You Seed, and Pacific Seeds/Advanta. The Vietnamese companies that are exporting seeds to Laos include Vinaseed and Green Seeds. Other multinational companies having commercial activities in Laos are Bayer, Monsanto, East-West Seed, and Enza Zaden.

Rice (paddy) cultivation is the most important agricultural activity in Laos. The government of Laos has strived to make the country self-sufficient in terms of production. Maize is the second major staple crop in the country after rice, followed by soybean.

Chilies & peppers form a major segment among the vegetables cultivated in Laos, followed by watermelon and other fresh vegetables, such as cucumber, cabbages, pak choy, Lao eggplant, carrot, Lao basil, pumpkin, snake gourd, galangal, and Mexican coriander.

Among the local crops, cassava is emerging as a cash crop, owing to its various industrial uses, such as extraction of starch and brewing alcohol. Cassava is followed by groundnut, sesame, sweet potato and pulses, which include mung bean, lablab bean, and pigeon pea. The most important non-food crop in Laos is tobacco.

The seed market of Laos is dominated by the informal sector. Provision for improved rice breeding materials is managed by a Laos-IRRI collaboration. Competition for smallholder farmers in Laos, from agricultural exports from Vietnam, Thailand, or Myanmar, is a risk in terms of price, quality, and quantity. China's strategic interests in the country suggest that Laotian farmers will be favored by trade regimes and investment promotion.

2.10 Cambodia

The overview of the seed sector in Cambodia was provided by correspondence with Rod Bassett, Head of Agriculture, Soma Group, in addition to (limited) secondary information.



Main seed companies in Cambodia

Seed companies	Crops sold in Cambodia				Business model			Cambodia revenue (USD mln)
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
CARDI	•	•			•	•	•	NA
AQIP Seed Company	•				•	•	•	NA
East-West Seed		•			•	•	•	NA

Main crops in Cambodia

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	2856001	Chilies & peppers, dry	13125	Cassava	329781	Tobacco	8404
Maize	119129	Fresh vegetables (nes)	83646	Sesame	42000		
Soybean	102000			Groundnut	18000		
Dry beans	67286			Sweet potato	9121		

At present, certified seeds sold in Cambodia come from Vietnam. There are some registered hybrid maize varieties of DowDuPont, Advanta and Charoen Pokphand on the market. Other companies, such as Groupe Limagrain and East-West Seed, have commercial activities in Cambodia; in 2017, East-West Seed established an office in Cambodia.

The Cambodian Agricultural Research and Development Institute (CARDI), AQIP Seed Company and a few small-scale private producers who work directly under the Ministry of Agriculture, Forestry and Fisheries (MAFF) constitute the local formal seed sector of Cambodia.

Community-based rice seed production supply systems are prominent in Cambodia. In addition to the community-based seed production, Angkor Kasekam Roongroeung is a large-scale private enterprise that carries out seed production.

Rice, maize, soybean and dry beans constitute the most important staple crops of Cambodia. Among the vegetable crops, chilies occupy a significant area of harvest. Other vegetables important in the country include spinach, cauliflower, lettuce and collard greens, but no separate area and production data are available for these crops.

Cassava is Cambodia's largest agricultural export crop, by capacity, and is the second-largest in terms of value, after rice. Apart from cassava, other local crops include sesame, groundnut and sweet potato. The most significant non-food crop in Cambodia is tobacco.

Several non-governmental organizations function in Cambodia. The Cambodian Centre for Study and Development in Agriculture (CEDAC) is working toward training farmers in the use of new techniques for community seed production and value-added approaches for organic rice production.

There are signs that other and local private players may enter the market, such as the Soma Group, a leading Cambodian company with operations in the agriculture, education, and infrastructure sectors. The seed sector of Cambodia is weakly integrated as the information about good quality seeds and their use is not efficiently communicated throughout the value chain. In most cases, the agro-input dealers are not well equipped to serve smallholder farmers, and hence their needs remain unaddressed.

2.11 Vietnam

Leading companies operating in Vietnam have been identified based on available secondary information, such as annual revenues in Vietnam, presence in important Vietnamese seed sub-markets such as maize, and through primary informants with good knowledge of the Vietnamese seed sector, such as Mordor's consultant, Sambit Satapatha, who has more than 20 years' experience in the Southeast Asian seed industry.¹¹



Main seed companies in Vietnam

Seed companies	Crops sold in Vietnam				Business model			Vietnam revenue (USD mln) 2015	% sales maize seed
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales		
Vinaseed	•	•			•	•	•	60 (2016)	7
Charoen Pokphand	•				•	•	•	NA	21
Southern Seed	•	•					•	23	19
Bioseed	•				•	•	•	8 ¹²	12
Monsanto/Dekalb	•	•			•	•	•	13	11
Syngenta (ChemChina)	•	•			•	•	•	NA	10
East-West Seed	•	•			•	•	•	NA	-
Trang Nong Seeds		•					•	NA	-
Thai Binh Seeds	•		•		•	•	•	NA	-

Main crops in Vietnam

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	7816476	Onions	94051	Cassava	552760	Tobacco	23215
Maize	1178648	Chilies & peppers, dry	65486	Groundnut	208149	Castor	8000
Dry beans	157832	Watermelon	51971	Sweet potato	130537		
Soybean	109351	Cabbages & brassicas	36020	Pulses (nes)	165497		
Potato	22823	Cauliflower & broccoli	7144				

Among the most important companies in Vietnam, Vietnam National Seed JSC (Vinaseed) and Southern Seed are leading. The market share of Vinaseed rice was 25%, while maize constituted 7%, while the figures for Southern Seed were 10% and 19%, respectively.

Globally, Vietnam is the fifth-largest producer of rice. Other staple crops include maize, dry beans, soybeans and potato. Onion, chilies & peppers, watermelon, cabbage & other brassicas and cauliflower & broccoli are important vegetable crops. The main local crops are cassava, groundnut, sweet potato and pulses. The main non-food crops include tobacco and castor.¹³

The Vietnamese agricultural sector has witnessed strong growth with the aid of subsidies and credit schemes, among others, being provided by the government. Only

about one-quarter of all seeds being used by smallholder farmers are quality certified.¹⁴

Almost 70-80% of the formal seeds used in Vietnam, which include hybrid rice seed, vegetable seed and maize seed, are imported. Hybrid rice seeds are imported mostly from China, while hybrid maize is imported mainly from Thailand and India, with vegetable seed imported from Thailand, China, Japan, Korea and France.

2.12 Indonesia

Main seed companies in Indonesia have been identified based on secondary research of statistical databases and discussions with representatives of seed companies.¹⁵



Main seed companies in Indonesia

Seed companies	Crops sold in Indonesia				Business model			Indonesia revenue (USD mln) 2016
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
Charoen Pokphand/ BISI Int.	●	●			●	●	●	139
DowDuPont	●				●	●	●	NA
East-West Seed		●			●	●	●	NA
Monsanto		●			●	●	●	NA
Advanta	●				●	●	●	NA
Nongwoo Bio		●			●	●	●	NA
Bioseed	●						●	8 ¹²

Main crops in Indonesia

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	13797307	Chilies & peppers	263616	Cassava	1003494	Tobacco	209400
Maize	3837019	Eggplant	50875	Groundnut	499338	Cotton	7855
Soybean	615685	Onion	120704	Sweet potato	156758		
Dry beans	208016	Cabbage & brassicas	63116	Roots & tubers (nes)	73502		
Potato	76291	Tomato	59008				

Charoen Pokphand (operating through its subsidiary BISI International), DowDuPont, East-West Seed and Monsanto are the main international companies that have operations in Indonesia. There are no leading local companies active in breeding and seed production in Indonesia. Currently, Advanta and Nongwoo Bio Seed are establishing a foothold in the country. Other global companies from the Access to Seeds Index list with a presence in Indonesia include Biogen/Syngenta (ChemChina), Bayer, Groupe Limagrain, Rijk Zwaan, Enza Zaden, Takii, Sakata and Bejo.

Indonesia is the world's third-largest rice producer, accounting for 8% of the global rice production. Other important staple crops of Indonesia are maize, soybean, dry beans, and potato. Among vegetables, chilies & peppers lead, followed by eggplant, onion, cabbage & brassicas, and tomato. Among the local crops, cassava, groundnut, sweet potato, and roots & tubers are important. The main non-food crops with significant areas of harvest include tobacco and cotton.

The government has various programs and subsidies for the development of rice, maize, and soybean production. The budget for seed quality programs for rice, maize, and

soybean increased from USD 6 million in 2005 to USD 150 million in 2010. This resulted in the spread of high-yielding varieties.

In Indonesia, seeds are produced through farmers' cooperatives and selected multinational companies. Forward contract agreements for seed multiplication between companies and farmers are common. The seed production system follows a formal and informal system. The formal seed system of staple crops, such as rice, maize, and soybean, is more established than that of vegetable crops. For rice, only half of the smallholder farmers in Indonesia prefer to use certified seeds.

For maize, smallholder farmers spend a lot of limited financial resources on purchasing seed, owing to increases in the price of the seed and seed shortages, which is thought also to be caused by climate change. Indonesia depends on imported soybean seed for almost 70% of its yearly demand. The availability of improved varieties would ensure less dependability of smallholder farmers on imported soybean seeds. A large portion of vegetable seed used is also imported into Indonesia.

2.13 Philippines

The main seed companies of the Philippines have been identified based on (limited) secondary sources and information obtained from Lito Patonona (President of Vigour Seeds) and Pablito Tolentino (Director, Vice President, and General Manager at Advanced Agrisolutions Philippines Corporation).



Main seed companies in the Philippines

Seed companies	Crops sold in the Philippines				Business model			Philippines revenue (USD mln) 2016
	Staple	Vegetable	Local	Non-Food	Breeding	Seed production	Marketing & sales	
DowDuPont	•				•	•	•	NA
Syngenta (ChemChina)	•				•	•	•	NA
Monsanto	•				•	•	•	NA
Bioseed	•				•	•	•	8 ¹²
Evogene Seeds	•				•		•	NA
East-West Seed		•			•	•	•	NA
Ramgo International		•			•		•	NA
Vigour Seeds	•				•	•	•	3
Kaneko Seeds		•				•	•	NA
S L Agritech	•				•	•	•	NA
Harvest Agribusiness		•					•	NA

Main crops in the Philippines

Staple crops	Area harvested in 2014 (ha)	Vegetables	Area harvested in 2014 (ha)	Local crops	Area harvested in 2014 (ha)	Non-food crops	Area harvested in 2014 (ha)
Rice	4739672	Eggplant	21159	Cassava	216775	Tobacco	36082
Maize	2611432	Pumpkin, squash & gourds	20056	Sweet potato	88968		
Dry beans	42978	Tomato	16742	Groundnut	25048		
Potato	7868	Onion	15844	Pulses (nes)	38695		
		Cabbage & brassicas	8310	Oilseeds (nes)	16400		

In the Philippines, the formal sector seed production takes place through institutes such as state government agencies, cooperatives (with governmental assistance), multinational companies, and the domestic private sector companies with their own R&D wings, as well as joint ventures (between multinationals and domestic private companies or between two domestic companies).

Top seed companies in the Philippines can be categorized based on crops. Maize seed companies include both foreign players, such as DowDuPont, Dekalb/Monsanto, Syngenta (ChemChina), Bioseed, and local companies such as Evogene, Cornworld, Vigour Seeds, Asian Hybrid Seeds, ACM Genetics, and RJR hybrid seeds.

Important vegetable seed companies include East-West Seed, Ramgo Seeds, Kaneko Seeds, Seminis/Monsanto, Harvest Seeds and Condor. The largest hybrid vegetable seed producer in the country is East-West Seed, which accounts for nearly 70-75% of the local market for hybrid seed and a major chunk of the overall seed market. Harvest Seeds is the local distributor of Known-You Seed.

Rice is the most important staple crop of the country, followed by maize, dry beans, and potato. The main vegetable crops are eggplant, pumpkin, squash & gourds, tomato, and onion.

The local crops with significant area of harvest include cassava, sweet potato, pulses and oilseeds.¹⁶ The main non-food crop is tobacco.

The government has set forth various policies for agricultural development. The Department of Agriculture (DA) governs the activities of the National Seed Industry Council (NSIC), Philippines.

Improved seed is less than 12% of the total seed being used per year by smallholder farmers. The rest is sourced from the informal seed sector. Due to insufficient knowledge of improved varieties of crops, and limited access to quality seeds, the varieties being used by farmers are mainly local landraces.

Private companies are the main source of high-value seeds like hybrids. However, it should be noted that the prevailing opinion is that these companies do not ensure smallholder farmer seed security at the community and household levels.

The Philippines, home to the International Rice Research Institute, is one the most prolific users of hybrid rice seeds in the region, produced by companies such as SL Agritech and Syngenta (ChemChina).

Endnotes

- 1 The data collected from FAO indicated discrepancies in some countries in terms of repetitive data in consecutive years, which has subsequently been rechecked against government sources. However, in those cases where rechecking was not effective due to a lack of data from government sources, the FAO data has continued to be used as the next best reliable alternative.
- 2 Additional sources used: Bishaw and Niane, Are Farmer-Based Seed Enterprises Profitable and Sustainable? Experiences of VBSEs from Afghanistan. ICARDA, 2016
- 3 The data collected from FAO on Afghanistan indicated discrepancies for sesame and cotton. These were rechecked against data from the Central Statistic Organization of Afghanistan, and changes have been made accordingly.
- 4 Additional sources used: Hussain and Bhutta, Focus on Seed Programs - The Pakistan Seed Industry. Seed Certification and Registration Department, 2002.
- 5 Additional sources used: Reddy and Tonapi, Seed System Innovations in the Semi-Arid Tropics of Andhra Pradesh (ILRI, 2007).
- 6 Likely to be an underestimate due to complicated structure of daughter companies of Groupe Limagrain in India.
- 7 Total revenue of BRAC. Revenue from seed sales and/or Bangladesh specifically is not available.
- 8 Additional sources used: LIFT, Making Vegetable Markets Work for Smallholders Myanmar, 2017
- 9 nes = not elsewhere specified
- 10 Discrepancies were found in data collected from FAO for tobacco, these were rechecked against the Central Statistic Organization (CSO), Myanmar and changes were made accordingly.
- 11 Additional sources used: Dung, The seed industry in Vietnam (IFPRI, 2014).
- 12 Combined revenue from Vietnam, Indonesia & Philippines.
- 13 Discrepancies were found in the data collected from FAO for castor. The General Statistics Office of Vietnam, which is responsible for agricultural statistics in Vietnam, has not published micro-level data on castor area harvested and/or production. The FAO data was therefore used as the next best reliable alternative.
- 14 Dung, Nguyen Mau. 2014. The seed industry in Vietnam. ReSAKSS Policy Note 17. Washington, D.C.: International Food Policy Research Institute (IFPRI).
- 15 Additional sources used: Perdinan, Kartikasari, Malahayati, Promotion of Climate Resilience in Rice and Maize, Indonesia National Study (ATWGARD, 2015).
- 16 Discrepancies were found in data collected from the FAO, for pulses (nes) and oilseeds (nes). The required micro level data is not available from The Philippine Statistics Authority (PSA). Given the lack of data from official national statistical organizations, the FAO data was used as the next best reliable alternative.