Regional landscaping report

For South and South-east Asia 2020

Access to Seeds Index

World Benchmarking Alliance

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Acronyms

AAIP	Afghanistan Agricultural Inputs Project
ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
APAARI	Asia Pacific Association of Research Institutions
ARIA	Agricultural Research Institute of Afghanistan
ASEAN	Association of Southeast Asian Nations
ATSI	Access to Seeds Index
BADC	Bangladesh Agricultural Development Corporation
CARDI	Cambodian Agricultural Research and Development Institute
CGIAR	Consultative Group for International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
FAO	Food and Agriculture Organization of the United Nations
FSC&RD	Federal Seed Certification & Registration Department
GAIN	Global Alliance for Improved Nutrition
GDP	Gross domestic product
GHI	Global Hunger Index
GM	Genetically modified
ICARDA	International Center for Agricultural Research in the Dry Areas
IFPRI	International Food Policy Research Institute
IRRI	International Rice Research Institute
ISE	Improved Seed Enterprise
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
MARDI	Malaysian Agricultural Research and Development Institute
NGO	Non-governmental organisation
OECD	Organization for Economic Cooperation and Development
SDGs	Sustainable Development Goals
SSEA	South and South-east Asia
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UPOV	International Union for the Protection of New Varieties of Plants
WBA	World Benchmarking Alliance

Introduction

The Access to Seeds Index for South and South-east Asia is part of the global 2021 Access to Seeds Index. It will evaluate the efforts of leading seed companies in South and South-east Asia (SSEA), with the aim of improving access to seeds for smallholder farmers. Improving smallholder productivity, in part through better access to quality seeds of improved varieties, is one of the main goals of the United Nations' 2030 agenda for sustainable development. By providing clarity on leadership and good practices in the industry, the Access to Seeds Index aims to contribute to achieving this goal.

The first SSEA Access to Seeds Index was published in 2019 and evaluated the efforts of 24 leading seed companies in the region. Thailand-based East-West Seed topped the index thanks to its smallholder-centric business model. Companies at the bottom of the ranking generally scored low because of a lack of disclosure, making it unclear whether they had the ambition and activities to support smallholder productivity. At the regional level, the industry was found to have a wide presence, be highly research driven and involved in the release of new varieties for a broad variety of crops. Seeds are also sold in package sizes tailored to the needs of smallholders. At the national level, however, seed sector development was found to be lagging behind. Ultimately, the majority of smallholders in the region have yet to be reached.

The second SSEA Access to Seeds Index is due to be launched in 2021 at the United Nations Food Systems Summit, alongside the World Benchmarking Alliance's (WBA) Food and Agriculture Benchmark. The regional index will evaluate the efforts of 31 leading seed companies, 7 more than in 2019 (Table 1). Companies were selected based on the following criteria: (1) regional presence or at least a regional influence; (2) physical presence and business activities in the region; (3) integrated seed business model; and/or (4) peer recognition as a leading company. The index will evaluate company activity in 14 countries: Afghanistan, Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand and Vietnam.

This landscaping report provides an overview of the seed sector in the region. In addition to the main seed industry players identified for benchmarking in the 2021 SSEA Access to Seeds Index, the report summarises the region's main crops, the enabling environment, observations on the results of the 2019 SSEA Access to Seeds Index and recent events affecting seed sector development, notably the COVID-19 pandemic.

Company	Country
Acsen HyVeg	India
Advanta *	United Arab Emirates
BASF *	Germany
Bayer *	Germany
Bejo *	The Netherlands
Bioseed	India
BRAC Seed and Agro Enterprise	Bangladesh
Charoen Pokphand Group	Thailand
Corteva Agriscience *	United States of America
East-West Seed *	Thailand
Enza Zaden *	The Netherlands
Indo-American Hybrid Seeds #	India
JK Agri Genetics #	India
Kalash Seeds	India
Known You Seed	Taiwan
KWS *	Germany
Lal Teer Seed	Bangladesh
Limagrain *	France
Mahyco	India
Namdhari Seeds	India
National Seeds Corporation	India
Nongwoo Bio	Republic of Korea
Nuziveedu Seeds	India
Punjab Seed Corporation	Pakistan
Rallis India	India
Rasi Seeds #	India
Rijk Zwaan *	The Netherlands
Sakata *	Japan
Syngenta Group *	Switzerland
Takii *	Japan
Vinaseed	Vietnam

* Globally active companies assessed for their investments in all 3 regions

New regionally headquartered companies added to scope

Integration with WBA for greater impact

The Access to Seeds Index has been developed by the Access to Seeds Foundation since 2012. By the publication of the 2019 edition, it was clear that the index had significantly improved the transparency of the seed industry, encouraged a range of improvements and provided a welcome evidence base for dialogue. However, linking these achievements to the global Sustainable Development Goals (SDGs) required partnership with other benchmarks. As a result, the Access to Seeds Foundation decided to align and integrate its model with WBA's food and agriculture transformation. The 2021 Access to Seeds Index will thus be a 'spotlight benchmark' linked to WBA's Food and Agriculture Benchmark, providing deeper insights into the contribution of the seed industry to the SDGs, in particular SDG 2 (zero hunger).

WBA's food and agriculture transformation encompasses two spotlight benchmarks: the Access to Seeds Index and the Seafood Stewardship Index. The Food and Agriculture Benchmark will broadly assess the performance of the 350 largest and most influential companies within the food value chain, among them a number of seed companies, on their contribution to global food systems transformation. The Access to Seeds Index will focus on and deepen insights into the contribution of the seed industry. This will include small- and medium-sized seed enterprises in South and South-east Asia and sub-Saharan Africa, both of which face high levels of hunger and rural poverty. The seed industry, with its key position at the start of the global food chain, is vital for realising multiple development goals. Chief among them is the goal of doubling smallholder productivity and incomes as part of efforts to achieve food security and end hunger (SDG 2), which the seed industry is well positioned to support.

Theory of change

A sustainable future for all, as outlined in the SDGs, can only be achieved through transformational change. Business can play a key role in leading this transformation by introducing sustainable, inclusive and innovative solutions.

Benchmarks provide an essential tool for measuring and comparing corporate performance on the SDGs. They equip financial institutions, companies, governments, civil society and individuals with the information they need to exert their full influence and encourage others to do the same. By supporting the private sector in its role to deliver on the SDGs, WBA can help companies move from aspiration to action to achievement.

By focusing its core benchmarks on keystone companies – companies with a disproportionate influence on a specific market or value chain – WBA aims to bring the transformations that are fundamental to achieving the SDGs beyond the tipping point: the point at which a series of small changes becomes significant enough to cause a larger, transformational change.

Through spotlight benchmarks, WBA aims to accelerate change around a specific critical challenge in each of the seven identified transformations.

Ensuring that smallholder farmers in South and South-east Asia and sub-Saharan Africa have access to quality seeds for food crops is one such critical challenge. Addressing the challenge can unlock the potential for resilient farming systems and an end to hunger. So far, not enough progress has been made. A multi-stakeholder approach involving both the public and private sector is needed, with an important role for seed companies to address the multiple burdens of food insecurity and malnutrition.

The Access to Seeds Index contributes to accelerating change in three ways: (1) by illuminating the private seed sector. This can inform policy decisions but also helps civil society actors and public sector bodies to build partnerships with private seed companies; (2) by ranking and comparing companies to channel the competitive spirit that drives performance in every industry; and (3) by inspiring the keystone companies included in the Food and Agriculture Benchmark. By demonstrating that agribusiness models that include smallholders are possible and profitable, seed companies can set an example for other companies in the global food chain, including beyond the seed industry, to follow.

Background to the landscaping report

This landscaping report covers 14 countries in South and South-east Asia, namely Afghanistan, Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand and Vietnam. Although the enabling environment varies between the countries, two main elements stand out: for smallholders, access to quality seeds is predominantly constrained by limited access to markets, low financial capital and knowledge gaps. For private seed companies, outdated seed laws and regulatory bureaucracy are a frequent disincentive to investment and growth.

The findings of the first SSEA Access to Seeds Index support the above analysis. These showed that the 24 index companies together reached no more than 20% of all active smallholders. India and Thailand, and to a lesser extent Bangladesh, Indonesia, the Philippines and Vietnam, can be considered seed hubs. These countries provide a favourable enabling environment for companies to operate. By comparison, no companies reported having breeding activities in Afghanistan, Cambodia, Laos, Myanmar or Sri Lanka. Neither was evidence found of seed production or processing activities in Afghanistan or Cambodia. In terms of marketing and sales, Afghanistan and Laos rarely featured on index companies' commercial radar. A lack of supportive policies was often cited as the reason for the limited growth of the private seed sector in these countries.

State-owned seed companies have a significant presence in the region, although the private seed sector is increasing its market share. However, state subsidies and publicly owned firms make it difficult for private companies to compete, hindering sector growth and investment in private seed production and marketing. Favourable policies are needed to ensure expansion of the private seed sector, as part of the development of agricultural production.

All 14 index countries are moving towards compliance with the Trade-Related Aspects of Intellectual Property Rights (TRIPS), an international agreement. Five countries – Afghanistan, India, Malaysia, Myanmar and the Philippines – are in the process of joining the International Union for the Protection of New Varieties of Plants (UPOV) as part of their commitment to plant breeders' rights. Cambodia, Indonesia, Laos, Pakistan and Thailand have asked for UPOV's assistance in developing similar laws. Vietnam is the only country that is already a UPOV member.

Asia remains home to the highest number of undernourished populations. According to the United Nation's 2019 report Asia and the Pacific Regional Overview of Food Security and Nutrition, an estimated 3 million undernourished people need to be lifted out of hunger every single month until the end of 2030 in order to achieve SDG 2.

In addition, an estimated 959 million people in the region experience moderate or severe food insecurity. The report highlights an increasing need to invest in high-quality data collection to monitor progress towards food security and better nutrition. This need was echoed in 2020 by the Food and Agriculture Organization of the United Nations (FAO), which noted that 'What doesn't get measured doesn't get done'.

Furthermore, the 2020 edition of the FAO's State of Food Security and Nutrition indicates that while Asia has shown progress towards meeting hunger and food insecurity targets, it will not achieve the 2030 targets. The COVID-19 pandemic is intensifying the vulnerabilities and inadequacies of food systems, regionally as well as globally.

Collaboration with key actors

The socialisation process for the Access to Seeds Index methodology is done through roundtables and dialogues that bring together stakeholders and experts from the regional seed industry. This process enables the exchange of knowledge within and between organisations, encourages learning and contributes to enhancing awareness and understanding about the role and performance of seed companies. It also promotes the use of the index results by different stakeholder groups.

The Access to Seeds Index aims to strengthen collaborations with regional partners to ensure that the methodology review is informed by their data needs, as well as to use existing channels, events and conferences to disseminate the index results. Partners in South and South-east Asia range from seed sector development actors, including the Asia-Pacific Association of Agricultural Research Institutions (APAARI), to industry federations such as the Asia and Pacific Seed Association (APSA) and several national seed agencies.

To meet the needs of those most impacted by the seed industry, the Access to Seeds Index aims to influence decision makers by including and amplifying the voices of farmers through dialogues with regional farmer organisations. These organisations are identified and recommended by the index's Regional Expert Review Committee, regional partners and a growing number of WBA Allies.

WBA Allies represent a broad cross-section of sectors and industries committed to using benchmarks to incentivise, measure and monitor corporate performance on the SDGs. To ensure that the seed industry is represented, the Access to Seeds Index welcomes interested actors to join the movement.

Unique resource for stakeholders

The Access to Seeds Index is a unique resource in the public domain for anyone interested in seed industry activity in the Global South. Research organisations like CGIAR institutes use information provided by the index to identify private sector partners that can help them bring new varieties to market. The index's findings are also used by the Global Alliance for Improved Nutrition (GAIN), which is interested in the availability of crop varieties with high nutritional value. Among farmer organisations, support for the index is strong. This is because the index's data is helping them to engage in informed dialogue with seed companies on how these companies can better serve smallholder needs. In addition, the effects of climate change have brought home the fact that collaborating with seed companies could be a way for farmer organisations to strengthen smallholder resilience.

The results of the 2019 SSEA Access to Seeds Index were widely reported by mainstream and specialised media such as seed magazines, agriculture news outlets and business and financial publications. Members of the index team also appeared on prime-time television in the region, including ANC News' morning show in the Philippines. Furthermore, seed companies, particularly those that ranked high, included items on the index in their company communications.

The seed sector in South and South-east Asia

The seed sector of the 14 countries included in this landscaping report is presented below.

Afghanistan

The informal seed sector dominates Afghanistan's seed market, with the formal seed sector mainly focusing on wheat. There is a need to strengthen private sector involvement in activities such as field demonstrations, marketing strategies and extension services to enhance smallholder access to quality seeds. Public-private partnerships will play a key role in the development of the national seed sector.

Nine companies included in the 2019 Access to Seeds Index had a presence in Afghanistan

Bangladesh

The public sector dominates plant breeding and seed production activities in Bangladesh. However, a growing demand for quality seeds and varieties adapted to local growing conditions is seeing NGOs and private companies increasingly becoming involved in these activities.

Twenty-three companies included in the 2019 Access to Seeds Index had a presence in Bangladesh

Cambodia

The state-owned Cambodian Agricultural Research and Development Institute (CARDI) and a few small-scale private producers who work directly under the Ministry of Agriculture constitute Cambodia's formal seed sector. The major constraints for seed supply are limited development of new varieties and their subsequent release, a lack of mechanised equipment and facilities, and a lack of capital for the seed industry. Additionally, the country's hot, humid climate means seed deterioration in both seed production fields and storage facilities is a major problem.

Twelve companies included in the 2019 Access to Seeds Index had a presence in Cambodia

India

The Indian seed industry is one of the most mature in the region. 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 is growing due primarily to increased investment in research and development, acceleration in the use of hybrid seeds, technological advances such as seed treatments and rising international trade. India is the only South Asian country participating in OECD seed schemes.

Twenty-six companies included in the 2019 Access to Seeds Index had a presence in India

Indonesia

Indonesia is becoming a competitive seed production hub. The government is committed to developing the agriculture sector, as evidenced by the Grand Strategy of Agricultural Development 2013-2045, the Strategic Plan of the Ministry of Agriculture 2015-2019 and the Law on Farmers' Protection and Empowerment 2013, among others.

Twenty-one companies included in the 2019 Access to Seeds Index had a presence in Indonesia

Laos

The seed sector in Laos is underdeveloped compared to other countries in the region. Most plant breeding and seed production 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 generally imported from Thailand and Vietnam.

Ten companies included in the 2019 Access to Seeds Index had a presence in Laos

Malaysia

Due to its location, the country is important for South-east Asian seed trade, with most local seed companies trading seeds rather than being integrated plant breeding companies. The Malaysian Agriculture Research and Development Institute plays an important role in the conservation of crop genetic resources. To facilitate the development of the seed sector, the National Seed Association of Malaysia contributes to the drafting of policies and regulations that ensure these consider the needs of the seed industry. The association also provides a platform for public-private partnerships.

Malaysia was not included in the geographic scope of the 2019 Access to Seeds Index, hence no data is available on the number of index companies active in the country.

Myanmar

Myanmar's seed industry has immense potential, in part owing to the country's proximity to major markets such as China, Bangladesh and Thailand. Vegetables constitute an important and often primary source of income for many smallholders. While most of the seed industry is dominated by the public sector, several international and regional companies appear to have entered the country relatively recently.

Fourteen companies included in the 2019 Access to Seeds Index had a presence in Myanmar

Nepal

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

Eighteen companies included in the 2019 Access to Seeds Index had a presence in Nepal

Pakistan

The government of Pakistan has research ties with international organisations such as the International Maize and Wheat Improvement Center (CIMMYT) and FAO to promote research and development in various crops of interest. Multinational companies have larger footprints in hybrid seeds for maize, sunflower, vegetables and sorghum whereas local companies are involved in cotton, rice and wheat.

Twenty-two companies included in the 2019 Access to Seeds Index had a presence in Pakistan

Philippines

In the Philippines, formal sector seed production takes place through institutes such as government agencies, cooperatives (with governmental assistance), multinationals and domestic private sector companies with their own research and development facilities as well as joint ventures (between multinationals and domestic companies or between two domestic companies). The country is one of the most prolific users of hybrid rice seed in the region.

Eighteen companies included in the 2019 Access to Seeds Index had a presence in the Philippines

Sri Lanka

Seed production activities in Sri Lanka, a biodiversity hotspot, are dominated by the public sector. Lack of knowledge about seed quality coupled with limited access to quality seeds are the main problems facing smallholders.

Nineteen companies included in the 2019 Access to Seeds Index had a presence in Sri Lanka

Thailand

Thailand's seed industry is among the most advanced and well-developed in the region. Thailand is an attractive hub for seed production thanks to its geography and weather, availability of highly trained plant scientists, a wide diversity of germplasm, good infrastructure, government support, foreign investments in the seed sector and the presence of multinational agencies and companies.

Twenty-one companies included in the 2019 Access to Seeds Index had a presence in Thailand

Vietnam

In Vietnam, 70-80% of the seed sold formally – including hybrid rice, maize and vegetable seed – is imported. With the maize seed market dominating Vietnam's formal seed industry, the country is witnessing significant developments in advanced maize breeding technologies and the introduction of biotech traits. Vietnam is the only index country that is a UPOV member.

Twenty-one companies included in the 2019 Access to Seeds Index had a presence in Vietnam

Seed sector response to COVID-19

The seed industry in South and South-east Asia responded to the outbreak of the COVID-19 pandemic by successfully lobbying governments to declare seeds an essential product that was not subject to movement restrictions during lockdown, thereby reducing the risk of farmers being unable to buy seed in time for planting.

However, delays in acquiring documents and certificates necessary for cross-border trade have hampered international seed movement. In addition, local travel restrictions on farmers themselves mean some have struggled to access input and output markets or acquire seed through their social networks.

In close consultation with other WBA benchmarks, the Access to Seeds Index is determining how the impacts of the pandemic and corporate responses to it should be addressed in the 2021 Access to Seeds Index benchmarking methodologies. Hence, although not part of this regional seed sector overview, the subject will be part of the 2021 Access to Seeds Index discussions moving forward.

Area harvested for global crops

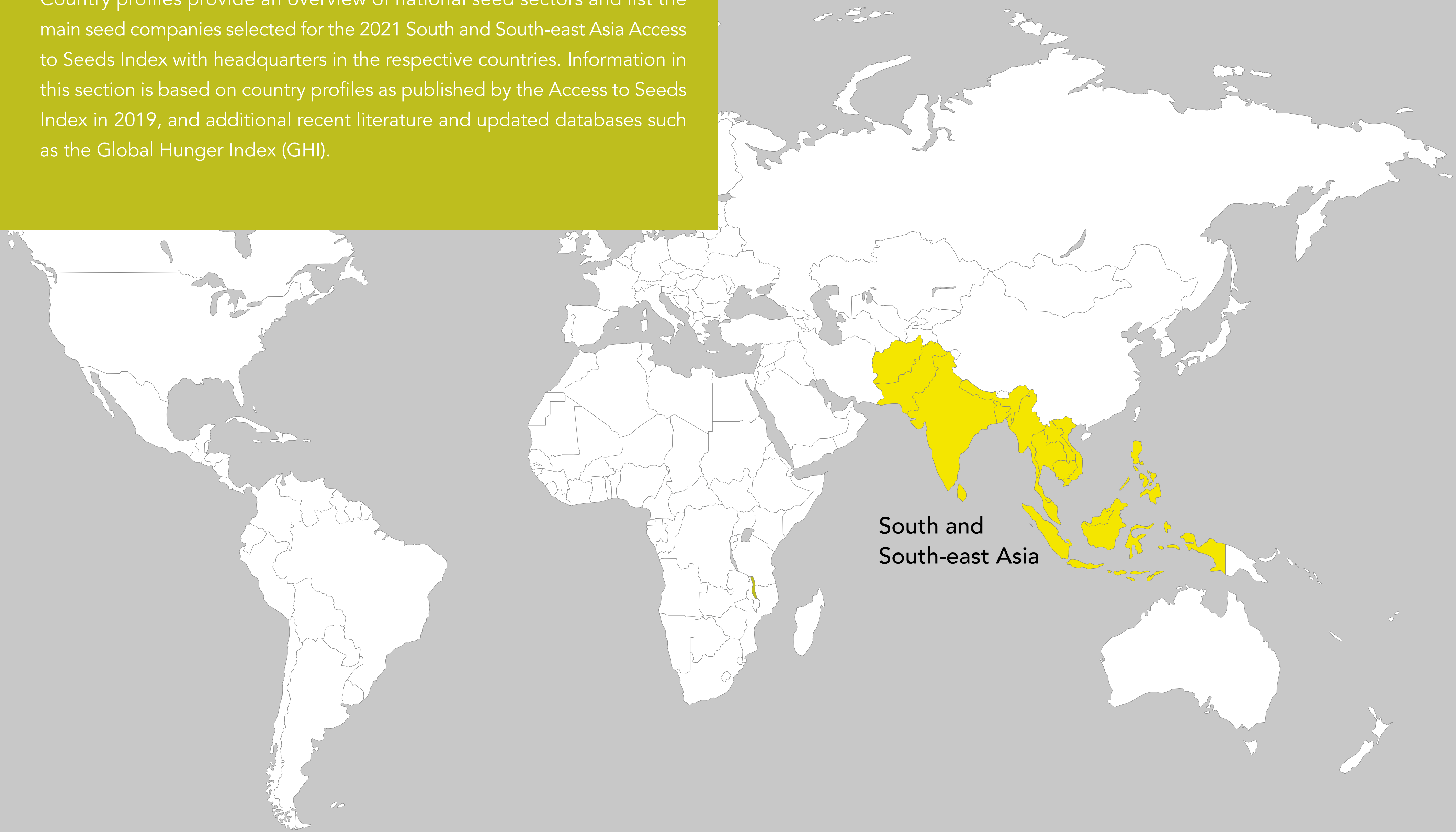
The Access to Seeds Index focuses on smallholders' access to quality seeds for major field and vegetable crops (so-called global crops). All are food crops. The index uses this data to evaluate whether companies have specific food crops in their portfolios of value to smallholders, and where companies see opportunities to develop suitable varieties tailored to regional conditions and preferences.

The area harvested for these crops in hectares (ha) was collected for all 14 index countries and is based on data published by the FAO in 2018. These are listed below.

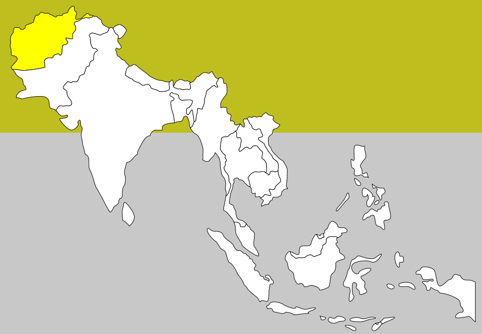
Field crops	Area harvested in ha (2018)	Vegetables	Area harvested in ha (2018)
Rice	111,824,205	**Onion**	2,005,494
Wheat	41,145,661	**Pepper (hot)**	1,249,534
Maize	23,166,974	**Tomato**	956,632
Beans, dry	17,089,064	**Eggplants**	821,727
Chickpea	13,259,064	**Pumpkin**	681,355
Soybean	12,545,508	**Squash**	
Millets	10,115,226	**Gourd**	
Groundnut	6,753,020	**Green bean**	575,872
Pigeon pea	6,133,020	**Green pea**	571,794
Sorghum	5,434,494	**Cabbage**	562,751
Sesame	3,468,354	**Okra**	536,873
Potato	3,197,382	**Cauliflower**	513,361
Sunflower	800,256	**Pepper (sweet)**	366,039
Cowpea	129,153	**Watermelon**	294,697
		Lettuce	209,532
		Cucumber	114,285
		Carrot	112,344
		Melon	111,190

Country profiles

Country profiles provide an overview of national seed sectors and list the main seed companies selected for the 2021 South and South-east Asia Access to Seeds Index with headquarters in the respective countries. Information in this section is based on country profiles as published by the Access to Seeds Index in 2019, and additional recent literature and updated databases such as the Global Hunger Index (GHI).



Afghanistan



Main crops

The main crops in Afghanistan were identified based on the area harvested in 2018. The table below lists the top five index field crops and the top three index vegetables.

Wheat is the major field crop, followed by rice, barley, maize and potato. Melon and watermelon are widely grown vegetables. Numerous other vegetables are grown, but no crop-specific area or production data are available.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Wheat	1,635,000	**Watermelon**	35,795
Rice, paddy	117,539	**Melon**	35,055
Barley	84,147	**Onion**	12,569
Maize	72,433		
Potato	32,400		

Region	South and South-east Asia
Development status	Least developed country
Participation in trade blocs	SAARC
GDP share of agriculture (%)	21
Employment in agriculture (% of total employment)	43
Country position on GHI severity scale (2020 score)	Serious hunger (30.3)
UPOV membership status	Initiated the procedure for acceding to the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	No
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	90/101
Law on plant variety protection	No

Overview of the seed sector

The key public sector players are the Agricultural Research Institute of Afghanistan (ARIA) and Improved Seed Enterprise (ISE). ARIA is involved in breeder seed production of released varieties whereas ISE produces foundation and registered seed. ISE is also responsible for developing high-yield and disease- and pest-resistant crop varieties adapted to the local climate.

The Ministry of Agriculture, Irrigation and Livestock's Afghanistan Agricultural Inputs Project (AAIP) is working towards strengthening the value chain for certified seed production, specifically wheat.

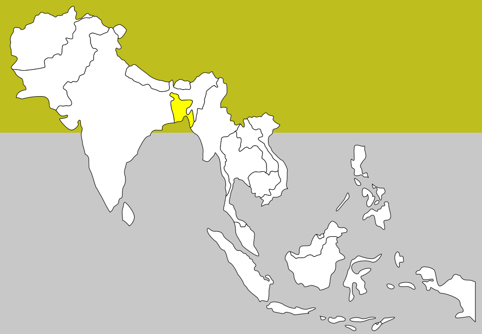
International organisations important in the seed sector include CIMMYT, the International Center for Agricultural Research in the Dry Areas (ICARDA), the Australian Centre for International Agricultural Research (ACIAR) and the FAO.

According to CGIAR sources, the development of village-based seed enterprises will create opportunities for smallholders to obtain improved seed. This is because of the role these enterprises can play in providing quality seeds of adapted varieties and in reducing the cost of seed transportation.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Afghanistan

None

Bangladesh



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Main crops

The main crops in Bangladesh were identified based on the area harvested in 2018. The table below lists the top five index field crops and the top four index vegetables.

Rice constitutes the most important staple food crop, followed by potato, maize, wheat and dry beans. Vegetables with a significant harvested area include onion, pepper (hot), tomato and pumpkin, squash and gourd.

Field crops	**Area harvested (2018)**	**Vegetables**	**Area harvested (2018)**
Rice, paddy	11,910,361	**Onion**	178,506
Potato	477,419	**Pepper (hot)**	101,072
Maize	400,478	**Tomato**	28,130
Wheat	351,228	**Pumpkin**	27,990
Beans, dry	83,340	**Squash**	
		Gourd	

Region	South and South-east Asia
Development status	Least developed country
Participation in trade blocs	SAARC
GDP share of agriculture (%)	13
Employment in agriculture (% of total employment)	39
Country position on GHI severity scale (2020 score)	Serious hunger (20.4)
UPOV membership status	Not a member
Participation in OECD seed schemes	No
GM crop approval for cultivation	Eggplant
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	75/101
Law on plant variety protection	Plant Varieties Act of Bangladesh (draft from 1998); references to a new draft Plant Variety and Farmers' Rights Protection Act were found but not confirmed

Overview of the seed sector

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

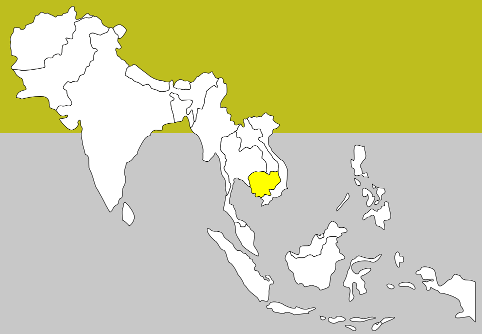
Agricultural research institutes are responsible for developing improved varieties of crops. Most of the plant-breeding activities take place in the public domain. However, to meet growing demand for good-quality and better performing varieties, NGOs and private companies are increasingly involved in plant-breeding activities.

The National Seed Policy, introduced in 1993, has played an imported role in involving private companies in the rice and maize seed business. However, there is an increasing need to enhance the enabling environment to encourage seed companies to invest in research and development.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Bangladesh

Company	Crop portfolio		Business model		
	Field crops	Vegetables	Breeding	Seed Production	Marketing and Sales
BRAC Seed and Agro Enterprise	✓	✓	✓	✓	✓
Lal Teer Seed	✓	✓	✓	✓	✓

Cambodia



Main crops

The main crops in Cambodia were identified based on the area harvested in 2018. The table below lists the top five index field crops and the most harvested index vegetable. Numerous other vegetables are grown, but no crop-specific area or production data are available.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	2,981,680	**Pepper (hot)**	14,183
Maize	123,439		
Soybean	105,000		
Beans, dry	67,442		
Sesame	40,000		

Region	South and South-east Asia
Development status	Least developed country
Participation in trade blocs	ASEAN
GDP share of agriculture (%)	21
Employment in agriculture (% of total employment)	32
Country position on GHI severity scale (2020 score)	Serious hunger (20.6)
UPOV membership status	In contact with UPOV for assistance in developing laws based on the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	No
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	85/101
Law on plant variety protection	Law on Seed Management and Breeders' Rights 2008

Overview of the seed sector

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

Community-based rice seed production supply systems are prominent. Only 36% of the cultivated rice is grown from commercial quality seeds because of farmers' limited access to these seeds.

Several NGOs are active in the seed sector. The Cambodian Centre for Study and Development in Agriculture trains farmers in the use of new techniques for community seed production and value-added approaches for organic rice production.

The seed sector is weakly integrated, as information about quality seeds and their use is not efficiently communicated throughout the value chain. In most cases, agro-input dealers are not well equipped to serve smallholders, and so their needs remain unaddressed.

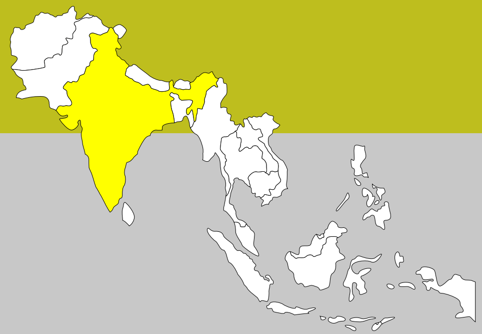
Registered seed companies are international companies that supply seeds throughout the region. The growing need to increase farmers' productivity is bolstering justification for seed companies' investments in quality seeds and supporting farmer training on good agricultural practices and other extension services.

In 2019, the Ministry of Agriculture, Forestry and Fisheries in cooperation with the International Rice Research Institute (IRRI) introduced a national seed strategy. This outlines a set of national strategic actions for the production and marketing of seeds for rice and other major agricultural crops. It is hoped that the strategy will foster an integrated system for seed production and distribution by 2023, which will benefit farmers by improving their access to quality seeds.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Cambodia

None

India



World Benchmarking Alliance

Main crops

The main crops in India were identified based on the area harvested in 2018. The table below lists the top five index field crops and vegetables.

Rice, wheat, dry beans, chickpea and soybean constitute the most widely harvested field crops. Among vegetables, onion, tomato, pepper (hot), egg-plant and pumpkin, squash and gourd are the most harvested.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	44,500,000	**Onion**	1,315,000
Wheat	29,580,000	**Tomato**	786,000
Beans, dry	13,545,518	**Pepper (hot)**	781,737
Chickpea	11,899,185	**Eggplant**	736,000
Soybean	11,400,000	**Pumpkin**	580,244
		Squash	
		Gourd	

Region	South and South-east Asia
Development status	Lower middle-income country and territory
Participation in trade blocs	SAARC
GDP share of agriculture (%)	16
Employment in agriculture (% of total employment)	42
Country position on GHI severity scale (2020 score)	Serious hunger (27.2)
UPOV membership status	Initiated the procedure for acceding to the UPOV Convention
Participation in OECD seed schemes	Yes
GM crop approval for cultivation	Cotton
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	49/101
Law on plant variety protection	Protection of Plant Varieties and Farmers' Rights Act 2001

Overview of the seed sector

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 and State Agricultural Universities have a long tradition of 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 and State Seeds Corporations. Agricultural subsidies in the form of investment subsidies and input subsidies are prevalent.

The private sector is heterogeneous and holds the primary market share. Increasing investments in research and development resulting from the favourable Protection of Plant Varieties and Farmers' Rights Act 2001 alongside plant breeding, rising use of hybrid seeds, various technological advances (such as seed treatments) and burgeoning international trade are some of the reasons for growth in the private sector.

To ensure farmers have access to quality seeds, the government is currently in the process of passing the Seed Bill 2019 to replace the Seed Act 1966.

Despite a generally positive outlook in the sector, labour conditions for workers in seed production are a concern. The seed industry has undertaken several initiatives to combat child labour at company and association levels, resulting in a decline in child labour cases in seed production. However, a recent study indicated that the prevailing market wages for workers were significantly below the statutory minimum wages fixed by the government.

World Benchmarking Alliance

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in India

Company	Crop portfolio		Business model		
	Field crops	Vegetables	Breeding	Seed Production	Marketing and Sales
Acsen HyVeg	✓	✓	✓	✓	✓
Bioseed	✓	✓	✓	✓	✓
Kalash Seeds	✓	✓	✓	✓	✓
Mahyco	✓	✓	✓	✓	✓
Rallis India	✓	✓	✓	✓	✓
Rasi Seeds	✓	X	✓	✓	✓
Namdhari Seeds	✓	✓	✓	✓	✓
National Seeds Corporation	✓	✓	X	✓	✓
Nuziveedu Seeds	✓	✓	✓	✓	✓
Indo-American Hybrid Seeds	✓	✓	✓	✓	✓
JK Agri Genetics	✓	✓	✓	✓	✓

Indonesia

Main crops

The main crops in Indonesia were identified based on the area harvested in 2018. The table below lists the top index five field crops and vegetables.

Indonesia is the world's third-largest rice producer. Other important field crops are maize, soybean, groundnut and dry beans. Among vegetables, pepper (sweet) is the most harvested, followed by onion, green bean, cabbage and tomato.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	15,995,000	**Pepper (sweet)**	308,547
Maize	5,680,360	**Onion**	156,779
Soybean	723,804	**Green bean**	122,699
Groundnut	353,768	**Cabbage**	66,110
Beans, dry	191,965	**Tomato**	53,850

Region	South and South-east Asia
Development status	Lower middle-income country and territory
Participation in trade blocs	ASEAN
GDP share of agriculture (%)	13
Employment in agriculture (% of total employment)	29
Country position on GHI severity scale (2020 score)	Serious hunger (19.1)
UPOV membership status	In contact with UPOV for assistance in developing laws based on the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	Sugarcane
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	Not included

Law on plant variety protection
Laws of Republic of Indonesia No. 29/2000 on Plant Variety Protection; Government Regulation No. 14/2004 concerning Requirements and Procedure of Transfer of PVP Right and Use of the Protected Varieties; Agriculture Minister Regulation No. 121/2013 concerning Requirements and Procedure of the PVP Right Granting

Overview of the seed sector

Indonesia is considered a competitive seed production hub. Seeds are produced through farmers' cooperatives and private seed companies. Contract farming agreements for seed multiplication between companies and farmers are common. Seed production occurs in both the formal and informal systems.

The government is committed to developing the agriculture sector, as evidenced by the Grand Strategy of Agricultural Development 2013-2045, the Strategic Plan of the Ministry of Agriculture 2015-2019 and the Law on Farmers' Protection and Empowerment 2013, among others.

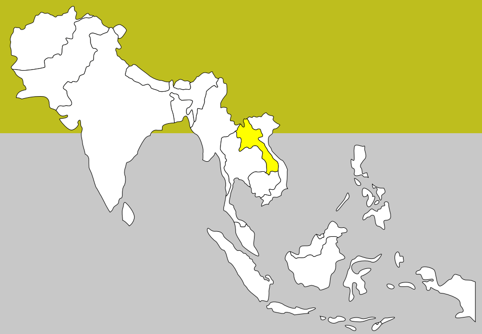
To assist the government in preparing its next five-year development plan (2020-2024), the Asian Development Bank in collaboration with the International Food Policy Research Institute (IFPRI) has set out policy recommendations as inputs to the government's development planning exercise. Recommendations include developing strategies to increase adoption of agricultural technologies and policies to reduce barriers to the approval and release of new seed varieties.

A large portion of vegetable seed is imported. The Agriculture Policy Act 2017 No. 15 (revised in May 2018) details the import and export regulations for vegetable seed. The law was passed with the objective of lowering the dependency on imports, ensuring the availability of quality seeds, increasing genetic diversity and developing the domestic seed industry.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Indonesia

None

Laos



Main crops

The main crops in Laos were identified based on the area harvested in 2018. The table below lists the top five index field crops and the top four index vegetables.

Rice cultivation is the most important agricultural activity in Laos, and the government aims to make the country self-sufficient in terms of production. Maize is the second most harvested field crop. The most widely cultivated vegetables are pepper (sweet and hot), watermelon and melon.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	848,174	**Pepper (sweet)**	13,497
Maize	165,620	**Watermelon**	10,385
Groundnut	19,995	**Pepper (hot)**	3,229
Sesame	13,035	**Melon**	1,525
Beans, dry	2,570		

Region	South and South-east Asia
Development status	Least developed country
Participation in trade blocs	ASEAN
GDP share of agriculture (%)	15
Employment in agriculture (% of total employment)	62
Country position on GHI severity scale scale (2020 score)	Serious hunger (provisional severity designation)
UPOV membership status	In contact with UPOV for assistance in developing laws based on the UPOV Convention
PParticipation in OECD seed schemes	No
GM crop approval for cultivation	No
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	835/101
Law on plant variety protection	Intellectual Property Law 2007 (enforcement in 2008, amended in 2011)

Overview of the seed sector

Laos' seed sector is underdeveloped. Most of the seed production and breeding is controlled by government bodies. There are farmers' multiplication groups and the public Rice Seed Multiplication Centre for rice seed. Official seed centres set up by the government supply improved seeds to farmers. However, farmers in rural areas do not have access to these seeds because of high transportation costs.

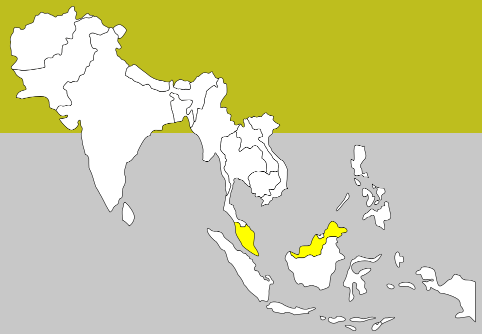
In 2015, the Ministry of Agriculture and Forestry developed the Agriculture Development Strategy to 2025 and Vision to 2030 to ensure national food security and build an agricultural production system.

Agriculture is dominated by rice cultivation, which is transforming from subsistence to commercial production. Laos collaborates intensively with IRRI to develop rice varieties that can better withstand the effects of climate change, such as increased occurrence of pests and disease, flooding and drought.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Laos

None

Malaysia



Main crops

The main crops in Malaysia were identified based on the area harvested in 2018. The table below lists the top two index field crops and the top five index vegetables.

Agriculture is dominated by cultivation of plantation crops such as oil palm and rubber. Regarding field crops, rice is widely grown. Among vegetables, watermelon, cucumber, pepper (hot), okra and lettuce are the most harvested.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	666,926	**Watermelon**	10,797
Maize	10,237	**Cucumber**	4,582
		Pepper (hot)	3,390
		Okra	3,219
		Lettuce	2,931

Region	South and South-east Asia
Development status	Upper middle-income country and territory
Participation in trade blocs	ASEAN
GDP share of agriculture (%)	7
Employment in agriculture (% of total employment)	10
Country position on GHI severity scale (2020 score)	Serious hunger (13.3)
UPOV membership status	Initiated the procedure for acceding to the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	Carnation (ornamental)
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	69/101
Law on plant variety protection	Protection of New Plant Varieties Act 2004; Protection of New Plant Varieties Regulations 2008

Malaysia

Overview of the seed sector

The Malaysian Agricultural Research and Development Institute (MARDI) plays an important role in the conservation of crop genetic resources. It has set up a gene bank that holds more than 12,770 registered accessions, of which 53% are of local origin.

The rice seed industry is relatively well developed compared to other field crops and vegetables. Most rice breeding and improvement is carried out by MARDI, which provides breeder and foundation seed of improved rice varieties. The Department of Agriculture is the main producer of rice seed, with support from other government agencies and private seed companies.

Due to its location, Malaysia is important for regional seed trade, with most local seed companies being seed traders rather than integrated plant breeding companies.

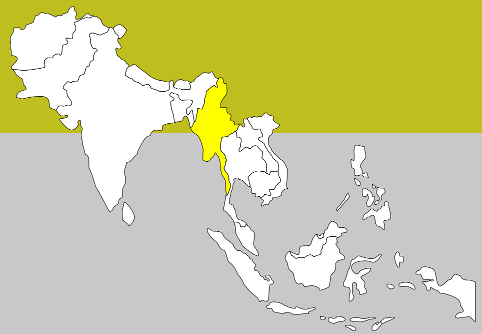
The government, through its National Agro-Food Policy 2021-2030, has plans to modernise the agriculture sector based on the latest technology. Increasing emphasis will be placed on research and development activities to produce new varieties that are resistant to climate change and can produce higher yields.

To facilitate the development of the seed sector, the National Seed Association of Malaysia is involved in drafting policies and regulations that consider the sector's needs. The association also provides a platform for public-private partnerships.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Malaysia

None

Myanmar



Main crops

The main crops in Myanmar were identified based on the area harvested in 2018. The table below lists the top five index field crops and top two index vegetables

Rice is the most important field crop. Other widely cultivated crops include dry beans, sesame, groundnut and pigeon pea. Pepper (hot) and onion are the most widely cultivated vegetables. Vegetables are an important source of income for almost 750,000 smallholders.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	6,705,577	**Pepper (hot)**	107,551
Beans, dry	2,701,865	**Onion**	66,202
Sesame	1,463,447		
Groundnut	1,028,960		
Pigeon pea	532,622		

Region	South and South-east Asia
Development status	Least developed country
Participation in trade blocs	ASEAN
GDP share of agriculture (%)	21
Employment in agriculture (% of total employment)	49
Country position on GHI severity scale (2020 score)	Moderate hunger (20.9)
UPOV membership status	Initiated the procedure for acceding to the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	Cotton
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	91/101
Law on plant variety protection	Plant Variety Protection Law 2016

Overview of the seed sector

Myanmar's seed industry has great potential, owing in part to its proximity to major regional markets such as China, Bangladesh and Thailand.

To help realise this potential, the National Seed Policy of 2016 outlines objectives including ensuring continuous access by all farmers to quality seeds of improved high-yielding crop varieties and promoting the use of quality seeds.

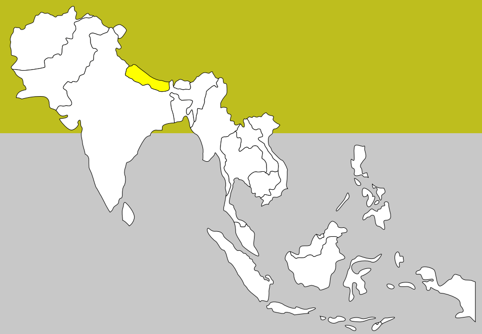
Myanmar regulates agricultural biotechnology through the National Seed Policy. This does not allow the import and planting of GM seeds except for the non-food crop cotton, which is partially allowed.

The recently established Myanmar Seed Association, a representative body of private seed companies that are active in the country, serves as a platform to stimulate dialogue between the public and private sector and other stakeholders on key sectoral issues, thereby promoting international and domestic business.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Myanmar

None

Nepal



Main crops

The main crops in Nepal were identified based on the area harvested in 2018. The table below lists the top five index field crops and vegetables

Rice is the staple food crop and accounts for a quarter of the total agricultural GDP. Maize is the second most important field crop, followed by wheat, millets and potato. Pepper (sweet and hot) are widely cultivated compared to other vegetables.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	1,469,545	**Pepper (sweet)**	11,282
Maize	954,158	**Pepper (hot)**	10,500
Wheat	706,843	**Lettuce**	486
Millets	263,497	**Cabbage**	283
Potato	195,268	**Cauliflower**	101

Region	South and South-east Asia
Development status	Least developed country
Participation in trade blocs	SAARC
GDP share of agriculture (%)	24
Employment in agriculture (% of total employment)	65
Country position on GHI severity scale (2020 score)	Moderate hunger (19.5)
UPOV membership status	Not a member
Participation in OECD seed schemes	No
GM crop approval for cultivation	No
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	73/101
Law on plant variety protection	No

Overview of the seed sector

Nepal's formal seed system comprises seed production by farms and stations of the Nepal Agricultural Research Council and the Department of Agriculture, contract seed production, NGOs, local biodiversity initiatives, research and development, private seed companies, community-based seed production and seed imports.

Public sector involvement in seed multiplication is high for field crops such as wheat, maize and rice while the private sector is involved in vegetable seed multiplication.

Major issues identified in the sector include low investment in plant breeding, poor seed processing and quality management procedures, lack of quality seed promotion and advertising campaigns, and weak extension programmes.

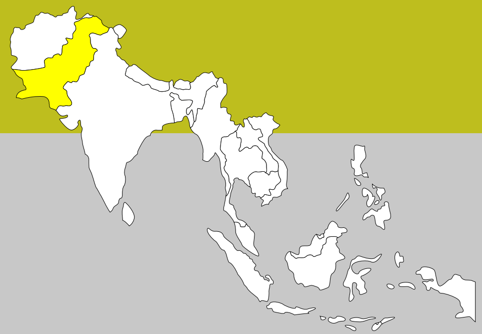
The government is trying to tackle these issues through its National Seed Vision 2013-2025. This aims to enhance farmers' access to quality seeds in order to boost crop productivity and improve food security. Furthermore, the vision emphasises creating an enabling environment to facilitate public-private partnerships.

The Nepal Seed and Fertilizer project, led by CIMMYT, is supporting the government in drafting national policies and guidelines. It also assists private seed companies in building competitive seed businesses and hybrid seed production.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Nepal

None

Pakistan



Main crops

The main crops in Pakistan were identified based on the area harvested in 2018. The table below lists the top five index field crops and vegetables.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Wheat	8,797,227	**Onion**	150,199
Rice, paddy	2,810,030	**Pepper (hot)**	65,275
Maize	1,318,104	**Tomato**	58,359
Chickpea	976,580	**Watermelon**	34,763
Millets	455,818	**Green pea**	26,992

Region	South and South-east Asia
Development status	Lower middle-income country and territory
Participation in trade blocs	SAARC
GDP share of agriculture (%)	22
Employment in agriculture (% of total employment)	37
Country position on GHI severity scale (2020 score)	Serious hunger (24.6)
UPOV membership status	In contact with UPOV for assistance in developing laws based on the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	Cotton, maize
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	63/101
Law on plant variety protection	Plant Breeders' Rights Act 2016

Overview of the seed sector

The Federal Seed Certification & Registration Department (FSC&RD), a department of the Ministry of National Food Security & Research, provides seed certification services to public and private seed institutes in Pakistan. FSC&RD works closely with international agencies and various other initiatives.

In 2019, the government launched the Prime Minister's National Agriculture Emergency Program in which 16 projects will be initiated to develop the agriculture sector. Projects for wheat, rice, oilseeds and other crops include development of high-yielding hybrid varieties and provision of certified seeds.

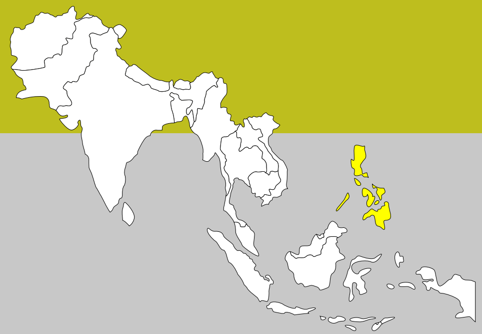
To enhance the availability, accessibility and affordability of quality seeds of field crops (wheat, maize and rice), the Agricultural Innovation Program for Pakistan, led by CIMMYT, is working with partners to benefit smallholders across the country.

In 2019, the Maize and Millets Research Institute and the Agricultural Research Institute released ten new maize varieties developed by CIMMYT for commercial cultivation.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Pakistan

Company	Crop portfolio		Business model		
	Field crops	Vegetables	Breeding	Seed Production	Marketing and Sales
Punjab Seed Corporation	✓	✓	✓	✓	✓

Philippines



World Benchmarking Alliance

Region	South and South-east Asia
Development status	Lower middle-income country and territory
Participation in trade blocs	SAARC
GDP share of agriculture (%)	9
Employment in agriculture (% of total employment)	23
Country position on GHI severity scale (2020 score)	Moderate hunger (19)
UPOV membership status	Initiated the procedure for acceding to the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	Maize
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	45/101
Law on plant variety protection	Plant Variety Protection Act 2002

Main crops

The main crops in the Philippines were identified based on the area harvested in 2018. The table below lists the top five index field crops and vegetables.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	4,800,406	**Eggplant**	21,651
Maize	2,511,436	**Pumpkin**	20,240
Beans, dry	41,581	**Squash**	
Groundnut	23,898	**Gourd**	
Potato	7,571	**Onion**	17,905
		Tomato	16,494
		Watermelon	8,368

Overview of the seed sector

The Philippines, home to IRRI, is one of the most prolific users of hybrid rice seed in the region. This is a response to climate change and the desire to achieve rice self-sufficiency.

While rice and maize are the main field crops cultivated, huge scope lies in the development of the vegetable seed sector.

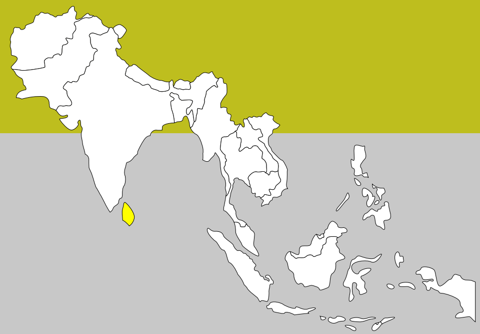
The strong regulatory framework for plant breeding and low cost to register varieties make the country attractive for seed business investments. GM maize is commercially grown. GM crops awaiting approval include Bt eggplant, Golden Rice, Bt papaya and Bt cotton.

The Department of Agriculture, which governs the activities of the National Seed Industry Council, recognises the major role of women in agriculture and is calling for a stronger, gender-inclusive seed system to further boost food production and farmers' incomes.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Philippines

None

Sri Lanka



Main crops

The main crops in Sri Lanka were identified based on the area harvested in 2018. The table below lists the top five index field crops and vegetables.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	1,040,954	**Pepper (sweet)**	13,553
Maize	70,895	**Eggplant**	10,834
Groundnut	15,752	**Pumpkin**	8,469
Sesame	11,873	**Squash**	
Cowpea	9,499	**Gourd**	
		Green bean	7,345
		Tomato	6,712

Region	South and South-east Asia
Development status	Lower middle-income country and territory
Participation in trade blocs	SAARC
GDP share of agriculture (%)	7
Employment in agriculture (% of total employment)	25
Country position on GHI severity scale (2020 score)	Moderate hunger (16.3)
UPOV membership status	Not a member
Participation in OECD seed schemes	No
GM crop approval for cultivation	No
ITPGRFA contracting party	Yes
Enabling the Business of Agriculture (2019 rank)	74/101
Law on plant variety protection	No

Overview of the seed sector

In Sri Lanka, a biodiversity hotspot, seed production activities are dominated by the public sector, notably the Department of Agriculture. Under this department, the Seed and Planting Material Development Centre aims to increase the quality of seeds and planting material. Meanwhile, the Seed Certification & Plant Protection Centre focuses on management of plant genetic resources, quality control of seed and planting material, and plant protection.

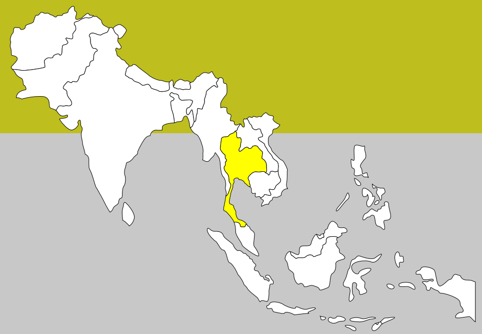
The country has opted for a sui generis system for the protection of plant varieties. However, no progress has been made in passing suitable legislation for plant variety protection after the draft Plant Variety Protection (Breeder's Rights) bill was introduced in 2001.

In 2017, the Department of Agriculture and Lal Teer Seed of Bangladesh implemented a joint project to increase vegetable seed production and decrease Sri Lanka's dependency on imported seeds. However, the continued lack of sufficient legislation protecting plant breeders' rights is discouraging greater involvement by private sector companies.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Sri Lanka

None

Thailand



Main crops

The main crops in Thailand were identified based on the area harvested in 2018. The table below lists the top five index field crops and the top four index vegetables.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	10,407,272	**Green bean**	167,982
Maize	1,110,944	**Pepper (hot)**	91,675
Beans, dry	106,236	**Cucumber**	16,950
Sesame	45,000	**Cabbage**	16,523
Soybean	32,000		

World Benchmarking Alliance

Region	South and South-east Asia
Development status	Upper middle-income country and territory
Participation in trade blocs	ASEAN
GDP share of agriculture (%)	8
Employment in agriculture (% of total employment)	32
Country position on GHI severity scale (2020 score)	Moderate hunger (10.2)
UPOV membership status	In contact with UPOV for assistance in developing laws based on the UPOV Convention
Participation in OECD seed schemes	No
GM crop approval for cultivation	No
ITPGRFA contracting party	Only signature
Enabling the Business of Agriculture (2019 rank)	59/101
Law on plant variety protection	Plant Variety Protection Act B.E. 2542 (1999)

Overview of the seed sector

Thailand dominates the regional seed industry. Several agencies within the Ministry of Agriculture and Cooperatives as well as external agencies such as the Thai Seed Trade Association and the Seed Association of Thailand are developing the country into a seed production hub.

Thailand is an attractive hub for seed production. This can be attributed to the favourable geography and weather, availability of highly trained plant scientists, a wide range of germplasm, good infrastructure, investments in the seed sector by foreign governments and the presence of multinational agencies and companies. Enhancing the seed export potential (mainly for maize and vegetables) and providing farmers with quality seeds (mainly for rice, pulses and forage crops) are the primary strategies that have been adopted to achieve the aim towards developing Thailand into a seed production hub.

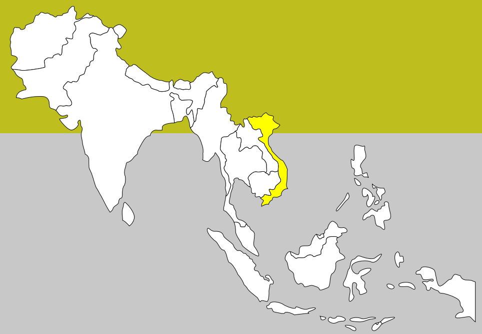
The government contributes significantly to seed business development by offering incentives to boost investments in the sector. These include corporate income tax exemptions for qualified investors investing in conventional plant breeding and import duty exemptions for machinery and raw materials. In addition, the leading seed companies have pledged to support improvement of the agricultural laws and regulations measured by the World Bank's Enabling the Business of Agriculture project, particularly those relating to plant breeding, variety registration and seed quality control.

In 2020, the National Bureau of Agricultural Commodity and Food Standards introduced the QR Trace On Cloud initiative, which brings digital traceability to Thailand's agricultural commodity supply chain. This is helping the government to manage grain commodity supply systems, but it is also building farmers' confidence in a reliable supply of field crop and vegetable seeds.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Thailand

Company	Crop portfolio		Business model		
	Field crops	Vegetables	Breeding	Seed Production	Marketing and Sales
East-West Seed	X	✓	✓	✓	✓
Charoen Pokphand Group	✓	✓	✓	✓	✓

Vietnam



Main crops

The main crops in Vietnam were identified based on the area harvested in 2018. The table below lists the top five index field crops and vegetables.

Field crops	Area harvested (2018)	Vegetables	Area harvested (2018)
Rice, paddy	7,570,741	**Onion**	101,656
Maize	1,032,598	**Pepper (hot)**	70,922
Groundnut	185,899	**Watermelon**	51,883
Beans, dry	143,492	**Cabbage**	36,869
Soybean	53,364	**Cauliflower**	7,289

Region	South and South-east Asia
Development status	Lower middle-income country and territory
Participation in trade blocs	ASEAN
GDP share of agriculture (%)	14
Employment in agriculture (% of total employment)	37
Country position on GHI severity scale (2020 score)	Moderate hunger (13.6)
UPOV membership status	UPOV member
Participation in OECD seed schemes	No
GM crop approval for cultivation	Maize
ITPGRFA contracting party	On
Enabling the Business of Agriculture (2019 rank)	58/101
Law on plant variety protection	Decree No. 94/2019/ND-CP (Decree 94) Law on Crop Production related to plant varieties and cultivation

Overview of the seed sector

Government agencies and universities carry out seed research activities in Vietnam. Most of the research institutes fall under the Ministry of Agriculture and Rural Development. In addition to the regulated formal seed system, the country has a vibrant informal seed system.

Around 70-80% of the seed in the formal seed system, including for hybrid rice, vegetables and maize, is imported. Hybrid rice seed is imported mostly from China whereas hybrid maize is imported mainly from Thailand and India. Vegetable seed is imported from Thailand, China, Japan, South Korea and France.

Vietnam is a UPOV member, which has contributed to an increase in breeding activities. GM maize was commercialised in 2015. In 2019, the Law on Crop Production regarding plant varieties and crop cultivation came into effect, superseding the 2004 Ordinance on Plant Varieties that for example prohibited the import of genetically modified plant varieties. The new law is expected to increase availability of improved varieties and the introduction of new foreign varieties.

Main seed companies selected for the 2021 SSEA Access to Seeds Index with headquarters in Vietnam

Company	Crop portfolio		Business model		
	Field crops	Vegetables	Breeding	Seed Production	Marketing and Sales
Vinaseed	✓	✓	✓	✓	✓

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