



Access to Seeds
Index

Methodology Report for the Access to Seeds Index 2015

Bridging the gap between the
world's leading seed companies
and the smallholder farmer

February 2015

Foreword

Early 2016 will see the publication of the first Access to Seeds Index. This will show the extent to which the seed industry uses its knowledge, technologies and varieties to benefit smallholder farmers. The Methodology Report 2016 defines exactly how the Index will do this: what we measure, how we measure it and why.

The seed industry can be described as a small group of global leaders and a long tail of – smaller – national and regional companies. In 2012, when the development of the Access to Seeds Index started, the initial idea was to focus solely on the role of the global leaders. During stakeholder consultations, it soon became clear that the Index should also focus on companies that play a vital role in a specific region. The Global Access to Seeds Index will therefore be complemented by a Regional Index, starting with the Eastern African region.

This Methodology Report describes in detail what is expected of seed companies with regard to their policies and practices in addressing the needs and demands of smallholder farmers. It is the result of extensive consultations with all stakeholders – farmers and farmer organizations, governments, NGOs, the FAO, academia and, of course, seed companies themselves. Yet, however extensive the discussion on the current methodology has been, the real dialogue with the industry will commence with the findings of the first Index.

The Access to Seeds Index draws its inspiration from the Access to Medicine Index, which has illustrated that an industry ranking can be a powerful force in engaging companies from a specific industry in a global challenge and its solution. Published every two years since 2008, the Index assesses the extent to which pharmaceutical companies contribute to the access to medicine agenda. In so doing, it has helped to increase knowledge, understanding and trust, paving the way for a collaborative road map to eradicate the neglected tropical diseases agreed on in 2012 by governments, the World Health Organization, the pharmaceutical sector and the Bill & Melinda Gates Foundation.

The second industry ranking of this kind was the Access to Nutrition Index, which was first published in 2013 and focuses on the contribution of global food and beverage manufacturers to food and nutrition challenges. While this index scores and ranks companies at the end of the food value chain (consumption), the Access to Seeds Index draws attention to the beginning of the food value chain (production), specifically the role the seed industry can play in increasing the agricultural productivity of smallholder farmers in developing countries.

In creating an industry-wide ranking, each index mentioned here strives to match stakeholder expectations with company performance, identify leadership in the industry through comparison and highlight good practice. In the case of the seed industry, however, it might be better to say that the first Access to Seeds Index aims to turn on the lights. The reality is that very little is known about the seed industry, which is at odds with the strong responses it often elicits and its strategic position at the beginning of the food value chain.

I would like to express my thanks to everyone involved in the development of this Methodology Report for their hard work, energy and time. In particular, I would like to thank the members of the Expert Review Committees for both the Global and the Regional Indexes for their strategic guidance and the Bill & Melinda Gates Foundation and the Dutch Ministry of Economic Affairs for their financial support.

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Access to Seeds Foundation

February 2015

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In this print-friendly version, blank pages from the hard copy have been omitted. The following page numbers are missing to align the numbering with the hard copy:
3, 4, 16, 25, 26, 40, 48, 49, 60, 61 and 72

The publication of the first Access to Seeds Index has been postponed until the beginning of 2016 to allow additional time for analysis. To avoid confusion, it was decided not to change the launch year on the cover of the Methodology Report, which has already been published. However from now on, the first Index will be referred to as the Access to Seeds Index 2016.

A woman wearing a purple hat and a pink and white plaid shirt is leaning over a large pile of yellow maize seeds on a tarp. She is sorting the seeds with her hands. In the background, other people are visible, some wearing colorful hats. The scene is outdoors, likely at a market or a community seed initiative.

Farmer Seed System

A female farmer in Zimbabwe is sorting maize seed for a community-based seed initiative. The informal seed system, or farmer seed system, continue to dominate in most developing countries, accounting for more than 80% of the total seed used by farmers. Farmers either save their own seed or rely for their supply on local markets or on their communities.

1. Introducing the Access to Seeds Index

Feeding the growing global population is one of the most pressing challenges of the 21st century. Smallholder farmers in developing countries represent an untapped opportunity to meet that challenge. By improving the availability of quality seeds, coupled with the right agronomic practices, the seed industry can play a major role in stimulating agricultural and economic growth. Throughout the industry, seed companies are already stepping up their efforts. The Access to Seeds Index seeks to identify the extent to which they are playing their part while encouraging them to enhance their role and responsibility.

1.1. Bridging the Gap

Food production has come under increasing pressure in recent decades, mainly as a result of a growing global population, climate change and structural dietary shifts. The amount of food produced needs to be increased, without depleting the world's resources and causing potentially irreversible environmental damage. Smallholder farmers in developing countries represent an untapped opportunity to intensify agricultural productivity. By improving their access to quality seeds, coupled with the right agronomic practices, that potential could be unlocked, thereby stimulating sustainable agricultural and economic growth. The use of high-yielding crop varieties has enabled farmers in advanced agricultural systems to triple their yields. What if smallholder farmers could gain similar access to knowledge, technologies and varieties?

Yet although higher yields in more advanced agricultural systems and the number of people who could thus be fed is no small achievement, it came at a price. The environmental impact of modern agriculture, which is characterized by high-carbon farming methods and loss of agricultural biodiversity, underscored the need to rethink our food production practices. In the search for alternative models, generally referred to as sustainable intensification, quality seeds are indispensable. Seeds are, after all, fundamental to agriculture.

Seed companies can play a key role in making quality seeds available to smallholder farmers, helping to transform agricultural systems and produce more in a sustainable way. The large number of farmers to be reached and their diverse needs and demands require market-based approaches. Throughout the industry, seed companies are stepping up their efforts. Yet a challenge of this magnitude can clearly not be solved by the private sector alone. Governments play a critical role in creating the right conditions for markets to flourish. Other actors, such as NGOs and farmer organizations, can join forces with seed companies to build capacity, enabling farmers to adopt new technologies. Learning from these initiatives and gaining a better understanding, both of the contribution companies are already making and the opportunities for them to do more, is at the heart of what the Access to Seeds Index sets out to do.

1.2. Companies as Part of the Solution

Forging new global partnerships is the overarching priority of the post-2015 development agenda. The report 'A New Global Partnership: Eradicate Poverty and Transform Economies through Sustainable Development', published by the UN Secretary-General's High-level Panel on the Post-2015 Development Agenda in May 2013, regards businesses as an essential participant in these partnerships. The question, of course, is how best to mobilize the potential of the private sector.

The Access to Medicine Index has illustrated that an industry ranking can be a powerful force in engaging that industry in a global challenge and its solution. Published every two years since 2008, the Index assesses the extent to which pharmaceutical companies contribute to the access to medicine agenda. In so doing, it has helped to increase knowledge, understanding and trust, paving the way for a collaborative road map to eradicate the neglected tropical diseases agreed on in 2012 by governments, the World Health Organization, the pharmaceutical sector and the Bill & Melinda Gates Foundation.

The second industry ranking of this kind was the Access to Nutrition Index, which was first published in 2013 and focuses on the contribution of global food and beverage manufacturers to food and nutrition challenges. While this index scores

and ranks companies at the end of the food value chain (consumption), the Access to Seeds Index draws attention to the beginning of the food value chain (production).

Following the example of these Indexes, the Access to Seeds Index measures and compares the efforts of the world's leading seed companies to enhance the productivity of smallholder farmers. By creating transparency and identifying leadership in the industry, the Index seeks to benchmark and improve the performance of these companies over time. The Index will be published every two years by the Access to Seeds Foundation, an independent organization supported by the Bill & Melinda Gates Foundation and the Dutch Ministry of Economic Affairs.

1.3. Global and Regional Index

The methodology for the Access to Seeds Index was developed based on input gathered during extensive multi-stakeholder consultations. One of the key insights that emerged from these consultations was the company scope. Since vegetables play an important role in the business model of smallholder farmers, as well as human nutrition needs, both global field crop and vegetable seed companies are included in the Index.

The seed industry can be described as a small group of leaders and a long tail of – smaller – national and regional companies. Therefore, stakeholders underlined the contribution of national and regional companies in reaching smallholder farmers, often in remote areas. As a result, a Regional Index will focus on these companies alongside the Global Index. The Regional Index will initially cover Eastern Africa and provide a template to roll out to other regions. The Indexes will be published concurrently, as some companies may feature in all three lists and the data collection for each list can take place at the same time.

The Index measures company activity in the seven areas that are considered key for improving access to quality seeds for smallholder farmers in Index regions. In turn, each measurement area is assessed with indicators. These have been carefully compiled to address all aspects of the multi-stakeholder agenda while offering genuine insights into the performance and behavior of individual companies.



○ **The Global Access to Seeds Index** assesses the role that the world's leading suppliers of seeds for both field crops and vegetables play in making their knowledge, technologies, varieties and seeds available to smallholder farmers. These companies have advanced research and development capabilities, play a pivotal role in shaping the market and can use their geographic spread to transfer solutions that work in one region to other regions. The Index focuses on companies with an integrated seed business model, covering the full seed value chain, from R&D and production through distribution. As the business models of field crop seed companies and vegetable seed companies differ, two separate lists have been drawn up.

Global Access to Seeds Index

Regional Access to Seeds Index for Eastern Africa

○ **Regional or national seed companies** are well positioned to reach smallholder farmers, not only by introducing solutions that have proven to work elsewhere but also by articulating the needs and demands of smallholder farmers to other players in the seed industry. The Regional Index will initially cover Eastern Africa and provide a template to roll out to other regions. The Regional Index focuses on regional companies as well as global companies with substantial activities in the region and national players that are regarded as leading players in their home market.

1.4. How the Index Works

The Access to Seeds Index measures and compares the efforts of the world’s leading seed companies to enhance the productivity of smallholder farmers. By matching the expectations of stakeholders in and around the seed industry with company performance, it helps to clarify the role that the seed industry can play and brings transparency to the contribution of individual companies. Through its findings, published in a report every two years, it contributes to an informed dialogue on how companies can step up their efforts. The approach is based on four components:

1.

Clear Expectations

To encourage the industry to assume greater responsibility in facilitating smallholder farmers’ access to seeds, expectations need to be stated clearly and collectively. Initial questions are considered, such as: What is expected of the industry? What role could it play? These questions are asked and answered through multi-stakeholder dialogue, resulting in a balanced stakeholder agenda.

2.

Objective Measurement

The balanced stakeholder agenda is translated into a methodology, with indicators that clearly measure the performance of each company included in the Index. For reasons of independence and impartiality, the Access to Seeds Foundation has no personal or financial ties to the companies assessed. An independent Expert Review Committee, which includes representatives from relevant stakeholder groups, advises the Foundation on the methodology.

4.

Transparency and Dialogue

The Index creates transparency around the roles that individual companies play by identifying good practices such as new products, successful partnerships and innovative, inclusive business models. In so doing, it feeds informed opinion on the role of the private sector, which is essential for a meaningful dialogue about helping smallholder farmers to improve their businesses. As an independent platform, the Index brings unique data to the table while complementing research conducted by global organizations, including the World Bank, on enabling agricultural growth and the role of governments. The Index aims to bring these information sources together in the dialogue.



3.

Positive Reinforcement

The Index seeks to highlight good practices and recognize leadership in the sector. It rewards companies that take responsibility, develop innovative, inclusive business models and bring knowledge and expertise to a partnership program. By creating transparency in the industry, the Index seeks to benchmark and improve the performance of these companies over time.

1.5. The Index Cycle

The Index is published every two years in a so-called ‘index cycle’. During the first year, the Index methodology is developed and reviewed based on the conclusions of the preceding Index. This results in the Methodology Report. In the second year, data is collected and verified, resulting in the publication of the Index Report. Companies can improve their ranking in the Index either by increasing their commitment to and performance around access to seeds or improving the transparency of their activities. The results and best practices identified by each Index are evaluated in stakeholder dialogues or roundtable conferences, with the aim of facilitating a learning process for the industry and other relevant actors.

1.

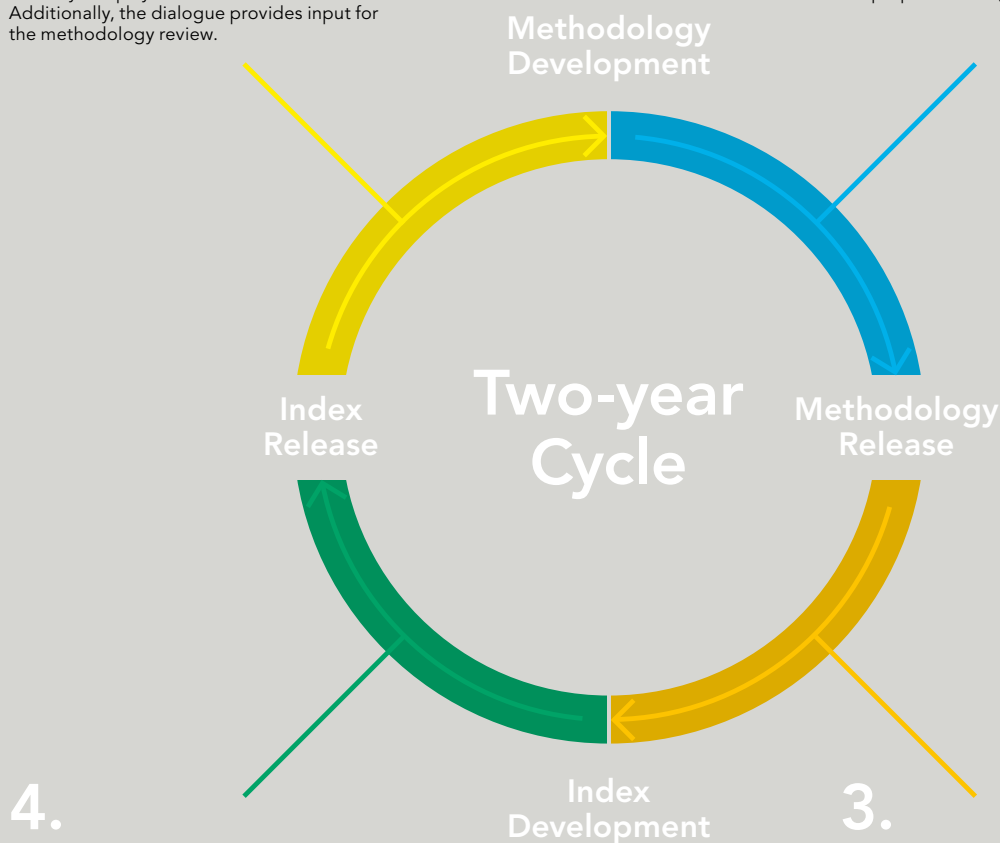
Dialogue and Consultations

To kick off the dialogue on the Index findings, the Access to Seeds Foundation organizes a roundtable conference after the publication of the Index report. Workshops on specific topics or dialogues with specific stakeholder groups can also be organized. The purpose of the dialogue is to create understanding on the role the seed industry can play and what it needs to do so. Additionally, the dialogue provides input for the methodology review.

2.

Methodology Review

The methodology is refined and improved based on lessons learned from the previous Index as well as changing expectations around the role of the seed industry. For this, the Access to Seeds Foundation engages with a variety of stakeholders, including the industry itself. The Expert Review Committee provides advice on the proposed changes and adjustments.



4.

Verification and Analysis

The analysis of the data both on a company level and an industry level is overseen by the Access to Seeds’ head of research. For verification purposes, Sustainalytics’ analysts carry out an extensive quantitative and qualitative check of each indicator for each company. For specific measurement areas, technical experts are requested to review the analysis. Everyone involved in the data collection process has signed a confidentiality agreement.

3.

Data Collection

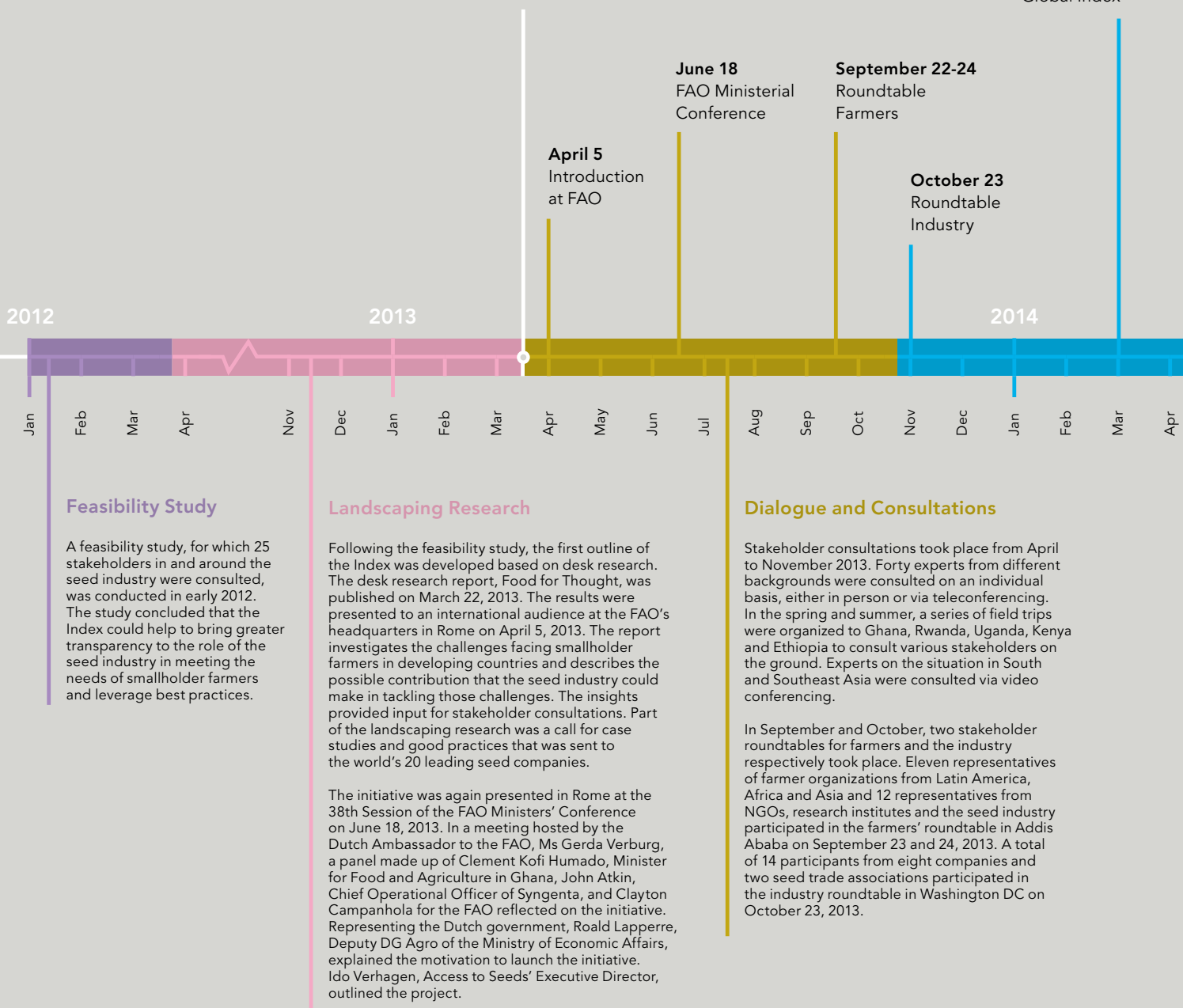
Research firm Sustainalytics performs the data collection. Scoring is carried out based on data from a wide range of information sources, including companies themselves. Companies receive a questionnaire to submit data in a carefully managed process that ensures equal treatment of each company. After an initial round of data collection and a second round for clarification, the full data set used for scoring is sent back to the companies for fact checking.

1.6. Development Process

The development of the Access to Seeds Index started with a feasibility study in 2012, followed by landscaping research in 2013. Based on the findings of the research phase, the development of the methodology for both the Global and Regional Index took place in 2014. At various points in the process, the progress was discussed during presentations at the FAO in Rome. Three roundtables were the highlights of the stakeholder engagement process.

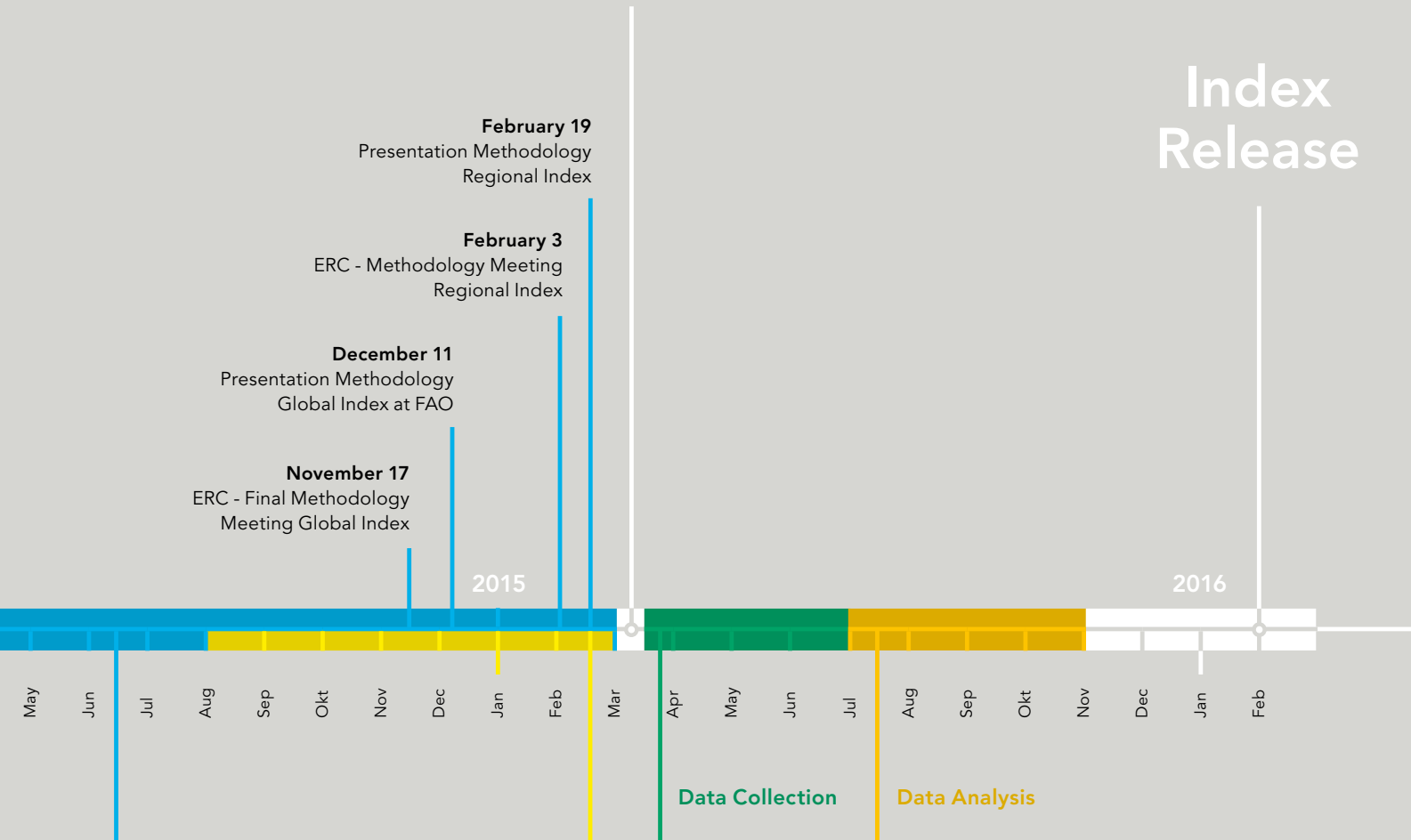
Research Report

March 3
ERC - Draft
Methodology
Meeting
Global Index



Methodology Release

Index Release



Methodology Development Global Index

Based on the insights gathered from the stakeholder consultations, development of the methodology for the Global Index started in November 2013. Experts from the research firm Sustainalytics supported the Access to Seeds team in this process. Two technical advisory meetings were held in February 2014. The meeting on February 6 focused on the areas of the Index that assess seed company activities in Index countries. The meeting on February 13 focused on genetic resources, intellectual property and research and development (R&D).

After a first evaluation by the Expert Review Committee on March 10, 2014, the second draft of the methodology was developed. It was made available for feedback on the Foundation's website in November 2014. The feedback received from various companies and NGOs provided input for the second meeting of the Expert Review Committee on November 17, 2014. On December 11, 2014 the methodology for the Access to Seeds Index 2016 was presented at the FAO's headquarters in Rome.

Methodology Development Regional Index

To develop the methodology for the Regional Index for Eastern Africa, the Nairobi-based consultancy firm Cardno Emerging Markets was selected in August 2014. For landscaping purposes, Cardno set up a network of experts in the 12 countries that are in the scope of the Index to consult stakeholders on the ground and collect relevant data on the seed industry and farmers' needs in those countries. The preliminary report providing baseline information for each country was published in December 2014.

Across the 12 countries, 52 seed company representatives and 39 stakeholder representatives provided input for the methodology, its scope and indicators. Additionally, a total of 17 farmers' focus groups were conducted to identify the needs, demands and constraints of smallholder farmers in the region concerning access to seeds. The Index methodology was developed in December 2014 and evaluated by the Regional ERC on February 3, 2015 in Nairobi, Kenya. On February 19, 2015 the Regional Index was discussed with various industry representatives and other stakeholders during the presentation of the methodology of the Index, this event also took place in Nairobi.

Expert Review

An Expert Review Committee (ERC), which is made up of individuals from a variety of stakeholder groups, is a key component in the stakeholder engagement process. Separate committees review the Global and Regional Indexes. The ERC evaluated the draft methodology and advised the Access to Seeds Foundation on finalization.

The ERC for the Global Index evaluated the methodology on March 10, 2014 and their advice and remarks were used to refine the methodology further. The ERC convened for a second time on November 17, 2014 for a final review. The outcome of this meeting enabled the Access to Seeds Foundation to finalize the methodology in February 2015. The Regional ERC convened on February 3, 2015 in Nairobi, Kenya to evaluate the methodology for the Regional Access to Seeds Index for Eastern Africa. Based on the advice that came out of this the methodology for the Regional Index was finalized in February 2015.

The diverse composition of the ERC ensures that different viewpoints and perspectives are taken into consideration when establishing the methodology for the Index. The ERC provides the Access to Seeds Foundation with strategic guidance, recommendations and advice on the scope, structure and content of the Access to Seeds Index. However, the board of the Access to Seeds Foundation remains ultimately responsible for decisions on the final methodology.

Expert Review Committee Global Index

Paula Bramel, Deputy Executive Director of the Global Crop Diversity Trust

Heleen van den Hombergh, Senior Advisor at IUCN NL

Gigi Manicad, Senior Program Manager at Oxfam

Christoph Amberger, former Board Member of KWS SAAT AG

Michael Halewood, Head of Policy Research at Bioversity International

Ram Kaundinya, former CEO and Managing Director of Advanta

Philip Kiriro, President of the Eastern Africa Farmers Federation

Thomas Osborn, former Senior Agricultural Officer at the FAO

David Spielman, Senior Research Fellow at IFPRI

Expert Review Committee Regional Index

Flora Mpanju, Senior Examiner at the African Regional Intellectual Property Organization

Dawit Alemu, Senior Researcher at the Ethiopian Institute of Agricultural Research

Dominic Gitau, former General Manager at Simlaw Seed Company

Stephen Mugo, Principal Scientist and Maize breeder at CIMMYT

John Kanyuithia Mutunga, CEO of the Kenya National Farmers' Federation

Essau Mwendu Phiri, Chairman of the National Smallholder Farmers' Association of Malawi

1.7. Index Framework

The Index framework provides a visual overview of the different components that make up the methodology of the Access to Seeds Index: the principles, the scope and the measurement areas with indicators.

Principles

Seeds are fundamental to agriculture. Yet it is clear that empowering smallholder farmers in developing countries entails more than simply making better seeds available to them. This is acknowledged in the five guiding principles of the Index and reflected in the indicators.

<p>Access Dimensions addresses what 'access to seeds' means to smallholder farmers. Stakeholder dialogue identified six dimensions: availability, affordability, suitability, capability, profitability and autonomy.</p>	<p>Farmer as Entrepreneur underscores the notion of smallholders who view their farms as a business. The focus of the Access to Seeds Index is on building sustainable business models, not on charity or donations.</p>	<p>Farmer Development acknowledges that access to seeds is only one of a number of factors affecting farmer development, including access to finance and output markets. Although this is not the core business of the seed industry, seed companies can nevertheless play an important role in furthering this approach.</p>	<p>Multiple Seed Systems reflects the Index's focus on the role of the formal seed sector, both public and private, but also looks at its interaction with other seed systems such as informal or farmer-based seed systems.</p>	<p>Sustainable Intensification acknowledges that while smallholder productivity needs to increase, it has to be achieved using fewer resources and minimizing or reversing negative environmental impacts.</p>
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Scope

The scope of the Index is defined in terms of (1) the companies included, (2) geographic focus and (3) crop selection. The scope is not fixed and can be adjusted for each consecutive Index.

<p>Companies The Index assesses the efforts of the world's leading seed companies with an integrated business model to improve smallholder farmers' access to seeds. As the business models of field crop and vegetable seed companies differ, two separate lists have been drawn up for the seven leading field crop companies and the ten leading vegetable seed companies (based on seed revenue). The Regional Access to Seeds Index for Eastern Africa will encompass global companies with substantial activities in this region as well as leading regional and national companies.</p>	<p>Geographic Areas Four geographic areas were identified by matching the challenge of food insecurity and yield gap with agricultural potential. The four areas are (1) Western Africa, (2) Eastern Africa, (3) South and Southeast Asia and (4) Latin America.</p>	<p>Crops Determined primarily by the needs and business models of smallholder farmers, the crop scope encompasses both field and vegetable crops. A list of nine major field crops and 25 major vegetable crops was drawn up based on area harvested in the target regions (the Index calls these 'global crops'). The Index also assesses seed company activities in so-called local crops, sometimes referred to as 'neglected and underutilized species' or 'orphan crops'.</p>
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Seven Measurement Areas

The Index measures company activity in the seven areas that are considered key for increasing access to quality seeds of improved varieties for smallholder farmers in Index regions.

<p>Governance and Strategy</p>	<p>Public Policy and Stakeholder Engagement</p>	<p>Genetic Resources and Intellectual Property</p>	<p>Research and Development</p>	<p>Marketing and Sales</p>	<p>Capacity Building</p>	<p> Local Seed Sector Advancement (Global Index)</p> <p> Production (Regional Index)</p>
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Seed Spacing

Bangladeshi farmers plant maize in a remote village in Chuadanga district, using a pre-measured planting string to help properly space seeds. In order to benefit optimally from improved seeds, it is essential that farmers understand best planting practices and plant crops in a way that produces the highest possible yields.

2. Principles

The Access to Seeds Index is guided by five principles: (1) access dimensions, (2) farmer as entrepreneur, (3) farmer development, (4) multiple seed systems and (5) sustainable intensification. These principles acknowledge that, while seeds are a key technology, empowering smallholder farmers in developing countries entails an integrated approach that extends beyond the seed industry alone.

2.1. Access Dimensions

In consultation with stakeholders, ‘access’ was defined as a broad concept with six dimensions: availability, affordability, suitability, capability, profitability and autonomy. Although this is what access means to smallholder farmers, it is not necessarily what is expected of seed companies. For each dimension, the Index seeks to explore both the possible roles and responsibilities of seed companies as well as what cannot be expected from them.

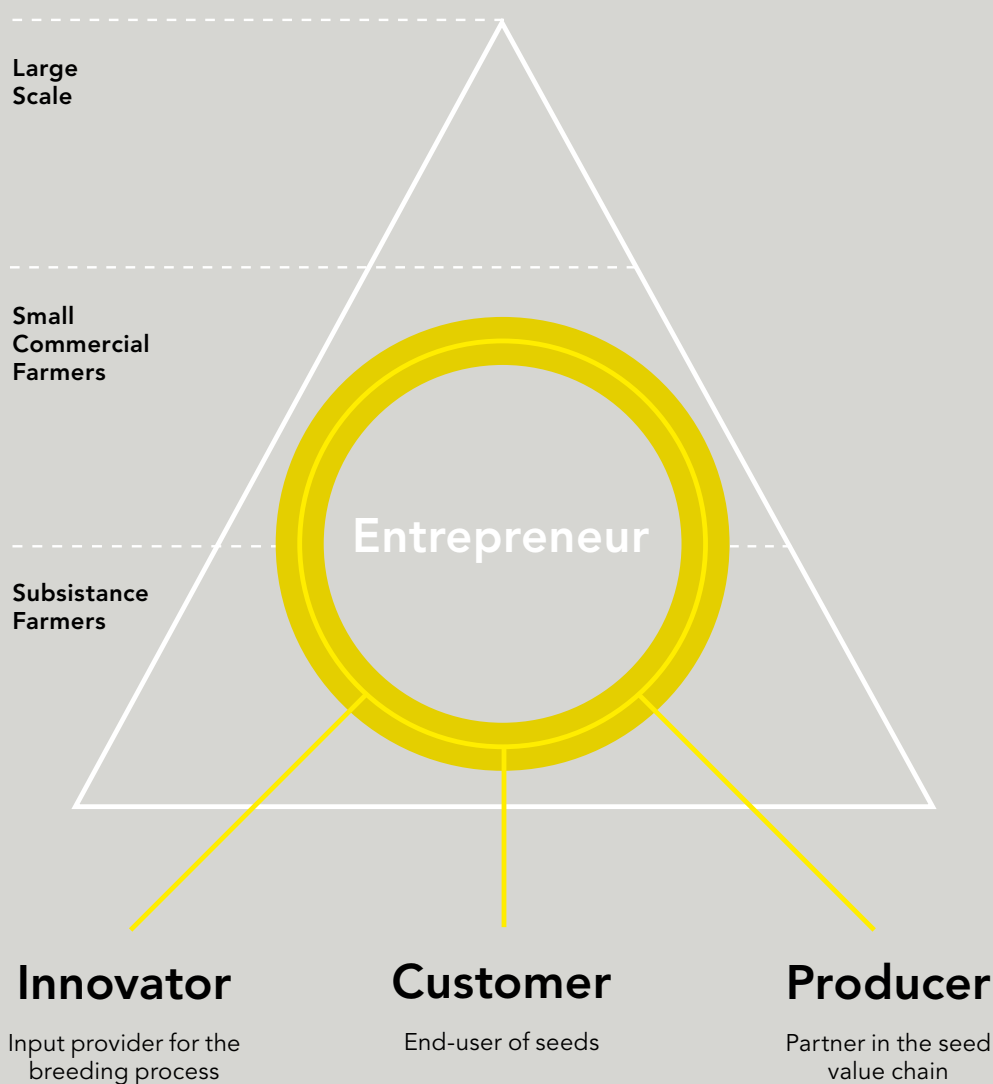


2.2. Farmer as Entrepreneur

During dialogue to determine the Index’s scope, stakeholders proposed viewing smallholder farmers as entrepreneurs with differing needs and capacity levels in their own production systems. Smallholder farmers who see themselves as entrepreneurs are more likely to build a business and adopt new technologies. As such, the Index focuses on sustainable business practices and does not emphasize charity or donations.

The literature often distinguishes between three types of farming communities in the developing world: large-scale commercial farmers, small commercial farmers and subsistence farmers. The boundary between large and small is generally set at 2 hectares. The concept of subsistence farming is problematic; farmers who produce mainly for their own livelihood still bring something to the market when the opportunity arises.

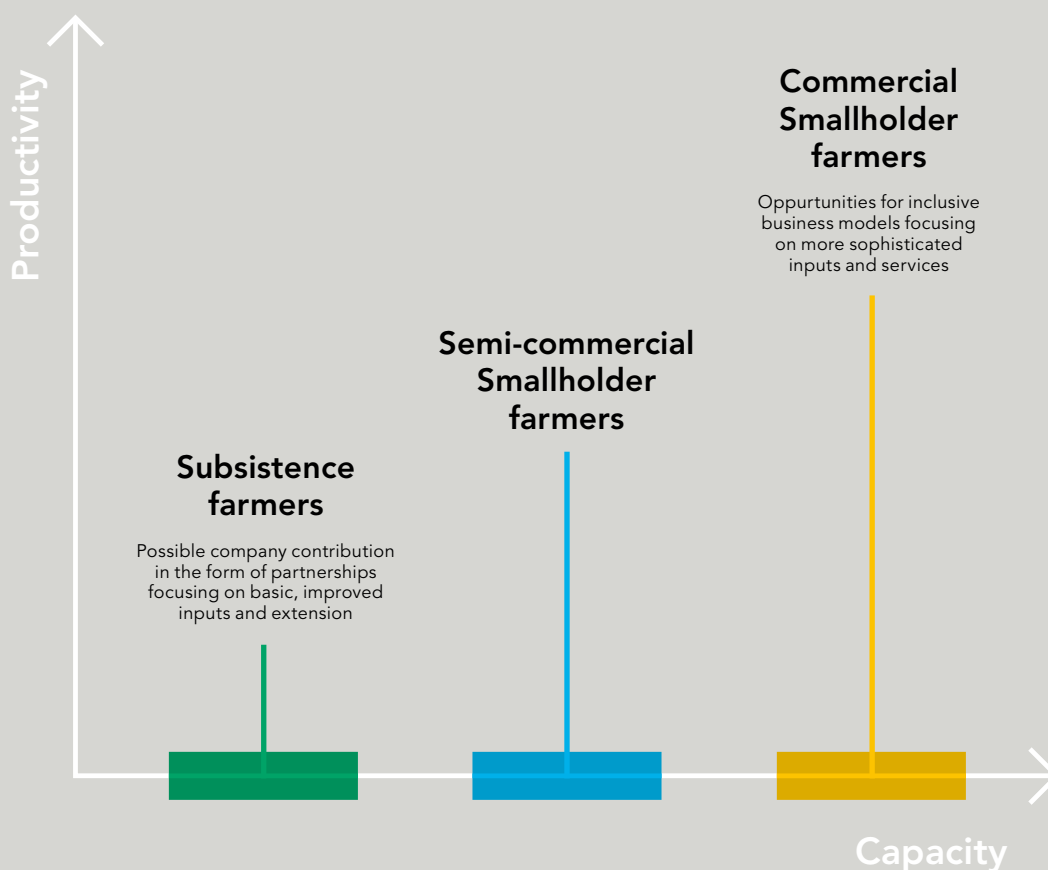
Rather than distinguishing between small commercial and subsistence farmers, the Access to Seeds Index views smallholder farmers as entrepreneurs at different stages of development. Large-scale farmers are excluded from the scope of the Index.



Additionally, it is important to acknowledge that farmers can play different roles in their interaction with seed companies. Farmers as end-users are primarily regarded as part of a company’s customer base. However, smallholders can also act as a link in a company’s seed multiplication value chain. Finally, smallholder farmers can be a source of innovation, as providers of local varieties or landraces for further breeding or as a knowledge base for local preferences and needs in the breeding process. The varying stages of development of smallholder farmers can be attributed to the production systems in which they operate. Production systems in fertile and irrigated areas with access to markets tend to use intensive cultivation methods and more modern varieties and seeds. Production systems in marginal rain-fed lands with less access to markets produce mainly for household or community consumption and use fewer modern varieties and seeds.

The level of capacity development of smallholder farmers has consequences for the possible role companies can play in addressing their needs. Business opportunities for seed companies are predicted to increase as capacity expands. For low-capacity farmers, the contribution of companies will likely be in the form of public-private partnerships that focus on demonstrations of improved varieties, improving agronomy through extension services and working with open-pollinated varieties.

At the other end of the spectrum, more opportunities for (inclusive) business models arise, with semi-commercial smallholders interested in using basic, improved inputs and commercial smallholders having the capacity for more sophisticated inputs. The Index’s indicators focus on whether companies see a role for themselves in addressing the needs of smallholder farmers at different capacity levels.



2.3. Farmer Development

Increasing the productivity of smallholder farmers in the developing world can make a major contribution to reducing hunger and poverty. However, access to seeds is only one aspect of farmer development. Desk research identified six factors that are essential for improving farmer output: policy, inputs, finance, knowledge and capacity, markets and farmer organizations.

It is clear that this integrated approach requires the involvement of various parties. Governments, both on a national and international level, play a key role in introducing a range of policies that enable farmer development, for instance around infrastructure, social security, education, agriculture, seed policy, intellectual property rights and trade. Civil society actors can also be partners in capacity building or supporting farmer organizations. Across the spectrum, multiple activities, alliances and initiatives are being set up, which are examined and assessed in the methodology.

Policy

Governments play a critical role in creating the right conditions for markets to flourish in policy domains including infrastructure, social security, agricultural policies, intellectual property rights, food and seed quality and trade policies. Through participation in trade unions, seed companies can contribute to the policy debate and advocacy.

Market Access

Linking smallholder farmers to output markets is a key factor in farmer development. Growing and changing domestic demands, for instance as a result of urbanization, provides opportunities for smallholder products. The Index evaluates whether and how seed companies play a role in linking food demand and smallholder production.

Finance and Services

Lack of access to finance prevents smallholders from adopting new and more productive capital-intensive techniques or higher value products. Through credit and insurance schemes or pricing strategies, seed companies can play a role in improving affordability.

Capacity Building

Low education and training levels are shown to inhibit the adoption of new and improved varieties. Different stakeholders, including seed companies, can provide capacity-building services. In a dedicated measurement area, the Index evaluates whether and how seed companies play a role. Thanks to their key role in agriculture, companies can have tailored strategies for female farmers.



Farmer Organizations

Through organizations, farmers can secure a better position in the value chain or achieve economies of scale. Farmer organizations can also act as intermediaries between seed companies and farmers as producers or users of seeds. The Index addresses this in the Capacity Building measurement area.

Inputs

Four types of physical inputs can have a strong impact on yield growths and smallholder development: seeds, agrochemicals, irrigation and mechanization. The Index evaluates whether and how seed companies see a role in increasing access to inputs other than seeds, for instance by including these inputs in their portfolio or addressing their adequate use in capacity-building activities.

2.4. Multiple Seed Systems

The Access to Seeds Index focuses on the commercial seed sector while acknowledging the important role of informal seed systems and the public seed sector.

Two types of seed systems are generally distinguished: formal and informal. The informal seed sector, also called the farmer seed system, is usually defined as the total seed production activities of (predominantly small-scale) farmers. In contrast, the formal sector refers to public and commercial seed production activities.

Typically, private seed companies concentrate on production and distribution of seeds that are economically profitable, such as hybrid maize, cotton and vegetables. For most self-pollinating food crops (cereals, legumes), the public sector, which includes international research institutes, is the major formal seed source of improved varieties. In most of the industrialized world, the formal seed sector has largely replaced the informal seed sector. The public sector has also largely withdrawn from breeding the crops dominated by the private sector, but often plays a role in self-pollinated crops, minor crops and upstream research.

It is uncertain whether seed systems in the developing world will follow the same path as the industrialized world. Many advocate an integrated approach that strengthens both the informal and formal seed sectors.

In line with this approach, stakeholder dialogue underlined the need to acknowledge the existence and importance of the informal and public seed sectors in developing countries. The Index in no way seeks to encourage the seed industry to outcompete existing informal seed systems. The Index will therefore also consider the interaction between the commercial seed system and other seed systems, and its indicators will examine seed companies' positions on topics such as the breeders' exemption and farmers' privilege, which are important for informal seed systems. It will also focus on collaboration with public partners and farmers as a source of innovation.



Informal Seed System

Informal seed sectors consist of community-based systems and farmers who save their own seeds and source seeds from local markets. Farmer seed production is in most cases integrated into normal crop production. Farmers select grains from their crop in order to obtain seed for their next planting. To ensure a good crop in the next season, selection is based on characteristics such as larger grains, non-shattering of seed and erect healthy plants. Since this selection has taken place over centuries by farmers in a number of ecosystems and with a range of objectives (for example grain and straw yield, cooking and consumption qualities, storage characteristics), informal seed systems are important sources of genetic diversity. They may also be the only source of preferred local varieties. Some farmers develop into specialists, supplying other farmers with a portion of their seed requirements.

Formal Seed System

Formal seed systems emerged in industrialized countries in the second half of the 19th century. The specialization of seed production and the development of a public and commercial seed sector were triggered by an increased understanding of genetics and plant breeding. The formal seed system is regarded as a chain that represents a one-directional flow of seeds from research through pre-breeding to breeding programs, and further through seed production, promotion and distribution programs to farmers' fields, where they are used as an external input. The formal seed sector is regulated by national legislation through national agencies that comply with international standards and methodologies. In developing countries, a formal seed sector has also emerged over the past decades.

2.5. Sustainable Intensification

Sustainable intensification has become an important cornerstone in the global thinking on the future of agriculture. The increase of smallholder farmer productivity, according to this principle, needs to be achieved without the use of substantially more land and with diminishing impact on the environment. The latter includes adverse effects on natural resources, including ecosystems and ecosystem services, as well as the conservation of agricultural biodiversity.

Sustainable intensification of agriculture focuses on making the current agricultural system more efficient through the use of improved technologies, including seeds, and by improving current production systems. Improved farming systems aim for efficient use of key inputs, including water, land and energy. Furthermore, these systems need to build resilience to abiotic, biotic and economic stresses while conserving biodiversity.

The Index addresses sustainable intensification in four ways:

Genetic and Crop Diversity

Seed companies can help preserve local crop diversity and the informal seed system by supporting public gene banks for *ex situ* conservation and community seed banks for *in situ* conservation. Through breeding programs and a broad portfolio, seed companies can also enhance the availability of a diverse set of crops and varieties in the market. Safeguarding genetic and crop diversity is also important for meeting future food and nutrition security needs.

Strengthen Resilience

Dedicated programs to develop specific traits with tolerance to abiotic stresses, such as heat, drought, flooding and salinization, and the biotic stresses of pests and diseases in Index countries, can significantly improve yield and performance. This can be particularly helpful in light of the expected effects of climate change on growing conditions.

Sustainable Intensification

Reduce Environmental Impact

New varieties are most beneficial when tailored to the needs of smallholder farmers in Index countries. This includes high-yielding varieties that reduce land, soil, water and input requirements. Seed companies can contribute to the availability of these varieties by testing their existing portfolio for suitability in Index countries or through dedicated breeding programs. For ecosystem health, the proven safety of new technologies and new seed varieties is an important issue, for instance to avoid invasiveness. In addition, the sustainable use of agrochemicals and avoidance of, for example, drainage or deforestation should be promoted.

Sustainable Farming Systems

Making improved technologies available to smallholder farmers can enhance the attractiveness of farming as a business for next-generation farmers. Through capacity building and increased productivity and income, a progressive transformation can be made away from subsistence and towards commercial farming.

A close-up photograph of a woman in Nigeria carrying a large, shiny metal pot on her head. She is wearing a colorful headwrap with yellow, green, and red patterns, and a vibrant, patterned top. In the background, another person is working in a field, and there are trees and a small tractor visible under a bright sky.

Soil Preparation

A female farmer in Nigeria prepares a field for planting. Often the most basic technologies can make all the difference for rural farmers. Raised beds create the perfect environment for a robust root foundation, which is vital for yielding a good crop. Roots need light, airy soil in order to establish an anchor for the plant.

3. Scope of the Index

The scope of the Access to Seeds Index is defined in terms of (1) the companies included, (2) geographic focus and (3) crop selection. The crop scope was determined largely by the needs and business models of smallholder farmers and encompasses both field and vegetable crops. The leading suppliers of seed for these crops determined the company scope. The geographic scope covers four target areas in Western Africa, Eastern Africa, South and Southeast Asia and Latin America. These areas were identified by matching the challenge of hunger, poverty and yield gap with agricultural potential.

3.1. Company Scope

Global Index

The Global Index assesses the efforts of the world's leading seed companies (based on seed revenue) with an integrated business model to improve smallholder farmers' access to seeds. As the business models of field crop and vegetable seed companies differ, two separate lists have been drawn up for the seven leading field crop companies and the ten leading vegetable seed companies. Four companies that are active in both areas appear on both lists.

For the field crop seed company list, all companies with an integrated business model and field crop seed revenues over \$1,000 million were selected. For the vegetable seed companies list, all companies with an integrated business model and vegetable seed revenues over \$100 million were selected. As not all revenues are publicly disclosed, the figures were gathered through a combination of desk research and stakeholder consultations and verified with multiple industry experts. During the data collection for the Index report, companies will be requested to provide current data.

Field Crop Seed Companies Global Index

Company	Country	Seed Revenues (\$mln)	Ownership
Monsanto	USA	10,010	Listed
DuPont Pioneer	USA	7,253	Listed
Syngenta	CHE	3,237	Listed
Groupe Limagrain	FRA	1,789	Cooperative/Listed
Dow AgroSciences	USA	1,360	Listed
KWS SAAT AG	DEU	1,319	Listed
Bayer CropScience	DEU	1,237	Listed

(Source: Stakeholder Consultations, 2013)

Vegetable Seed Companies Global Index

Company	Country	Seed Revenues (\$mln)	Ownership
Monsanto	USA	820	Listed
Groupe Limagrain	FRA	620	Listed
Syngenta	CHE	550	Listed
Bayer CropScience	DEU	410	Listed
Rijk Zwaan	NLD	340	Private
Takii	JPN	340	Private
Enza	NLD	250	Private
Sakata	JPN	250	Listed
Bejo	NLD	200	Private
East-West Seed	THA	150	Private

(Source: Stakeholder Consultations, 2013)

Regional Index

The Regional Access to Seeds Index for Eastern Africa evaluates the activities of the leading seed companies in this region on their efforts to improve access to seeds for smallholder farmers.

A longlist of companies was composed based on information from national authorities and seed trade associations, stakeholder consultations and field

research. This landscaping resulted in three groups of companies: (1) global seed companies that originate outside the region (2) regional companies that originate within the region with activities in multiple countries and (3) national seed companies with operations limited to the national level. The global and regional seed companies were selected based on the following criteria:

1. Integrated business model

This criterion is based on the number of different value chain nodes in the company's scope of operations (R&D, Production, Marketing and Sales, Capacity Building). Companies with at least three value chain steps were selected.

2. Mutual identification/peer recognition

Companies that were recognized by their peers as being leading players on a regional or national level were selected.

3. Physical presence and business activity in the region

Some companies on the long list access the region's seed market only through agents. This reduces their impact on the market and farmers. Companies with a physical presence in multiple countries in the region were selected.

Many seed companies are active at the national or even local level. Only national seed companies with a broad value chain scope and peer recognition as major players with industry influence in their home market were selected.

The seed industry landscape has undergone considerable changes over the past year, mainly due to the acquisition of regional seed companies by global players. This development is expected to continue in the coming years. Although the acquired company might still be active in the market under its own brand, the Index includes its activities in the assessment of the mother company.

Seed Companies Regional Index for Eastern Africa

Company	Country	Seed Portfolio	Ownership	Category
Demeter Seed Co.	MWI	Field crops	Private	National
DuPont Pioneer (including Pannar)	USA	Field crops Vegetables	Listed	Global
East African Seed Co.	KEN	Vegetables	Private	Regional
East-West Seed Co.	THA	Vegetables	Private	Global
Ethiopian Seed Enterprise	ETH	Field crops	State owned	National
FICA Seed Co.	UGA	Field crops	Private	Regional
Hygrotech Seed Co.	ZAF	Vegetables	Private	Regional
Kenya Highlands Seed Co.	KEN	Vegetables	Private	National
Kenya Seed Co.	KEN	Field crops Vegetables	State owned	Regional
Monsanto (including National Seed Co. of Malawi)	USA	Field crops Vegetables	Listed	Global
NASECO	UGA	Field crops	Private	Regional
Pop Vriend	NLD	Vegetables	Private	Global
Seed Co.	ZWE	Field crops Vegetables	Listed	Regional
Syngenta (including MRI)	CHE	Field crops Vegetables	Listed	Global
Technisem Seed Co.	FRA	Vegetables	Private	Global
Victoria Seed Co.	UGA	Field crops Vegetables	Private	Regional
ZamSeed Co.	ZAM	Field crops Vegetables	Private	National

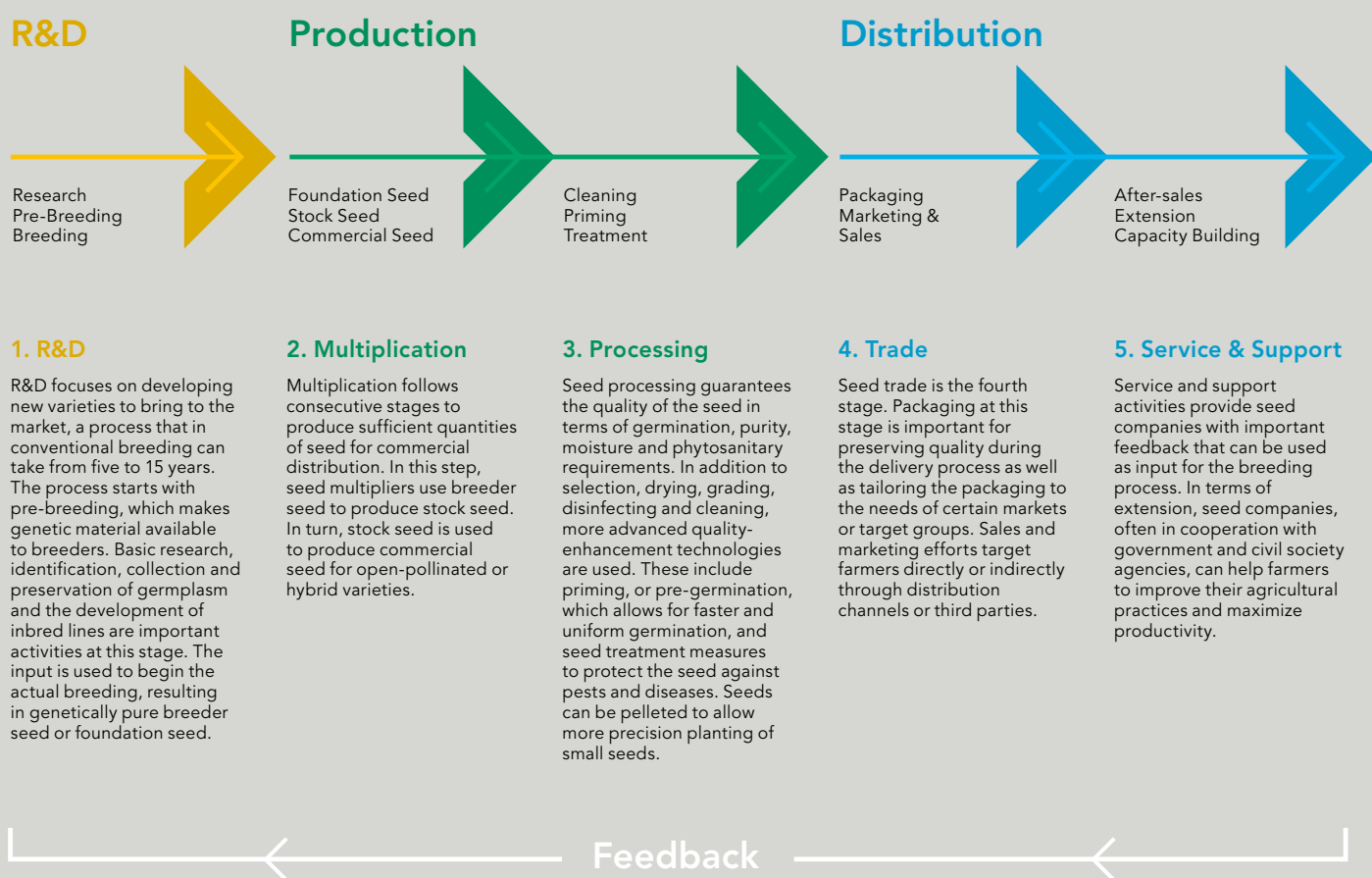
(Source: Research by Cardno, 2014)

What is an Integrated Seed Business Model?

The global seed industry can be described as a small group of leading players and a long tail of regional, national and niche players. Different business models exist throughout the seed industry. The leading seed companies generally cover the full seed value chain, from R&D and production through distribution. This is called an integrated seed business model. Further down the long tail, other models include seed production companies that use the breeding results of public research institutes or other companies, for instance on a license basis. Another common model is seed traders who focus on distribution.

A business development model often seen in emerging markets is a seed company that starts out in distribution and expands upstream to multiplication and R&D. Within the leading seed companies, a shift in the revenue model can be observed, with revenues from intellectual property – for instance through licensing – gaining importance. Consequently, the role of R&D for developing new varieties or traits is becoming more prominent.

The seed value chain can be divided into five stages:



3.2. Geographic Scope

Recognizing that seed companies generally take a regional approach when entering emerging markets, the Access to Seeds Index has identified four regions to measure companies' efforts to reach smallholder farmers. Matching the challenge of hunger, poverty and yield gap with agricultural potential identified the regions.

The challenge was determined using three criteria: (1) countries with a value higher than 5.5 in the Global Hunger Index, (2) the presence of smallholder farmers growing target crops at subsistence and low-input levels and (3) areas with a considerable yield gap. Three other criteria were used to identify potential: (1) crop suitability, (2) the presence of cropland and (3) market accessibility.

Following this exercise, four geographical zones were identified. To delineate the areas, the United Nations geoscheme was used. All contiguous countries within a specific UN region that met the criteria for both challenge and potential were selected. Following expert advice, the countries in Central America, the Caribbean and South America were combined in one Index region (Latin America). The Index also defines the countries in Southern and Southeastern Asia as one Index region (South and Southeast Asia).

Latin America

All contiguous countries that met the criteria for challenge and potential have been included in this area. This is with the exception of Panama and Costa Rica, which scored too low in the Global Hunger Index.

Index countries: Belize, Bolivia, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Paraguay and Peru.

Western Africa

Nearly all countries in Western Africa met the criteria, except for Mauritania, which was excluded. Chad and Cameroon, which also showed potential but are not part of Western Africa, are not included in the scope.

Index countries: Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

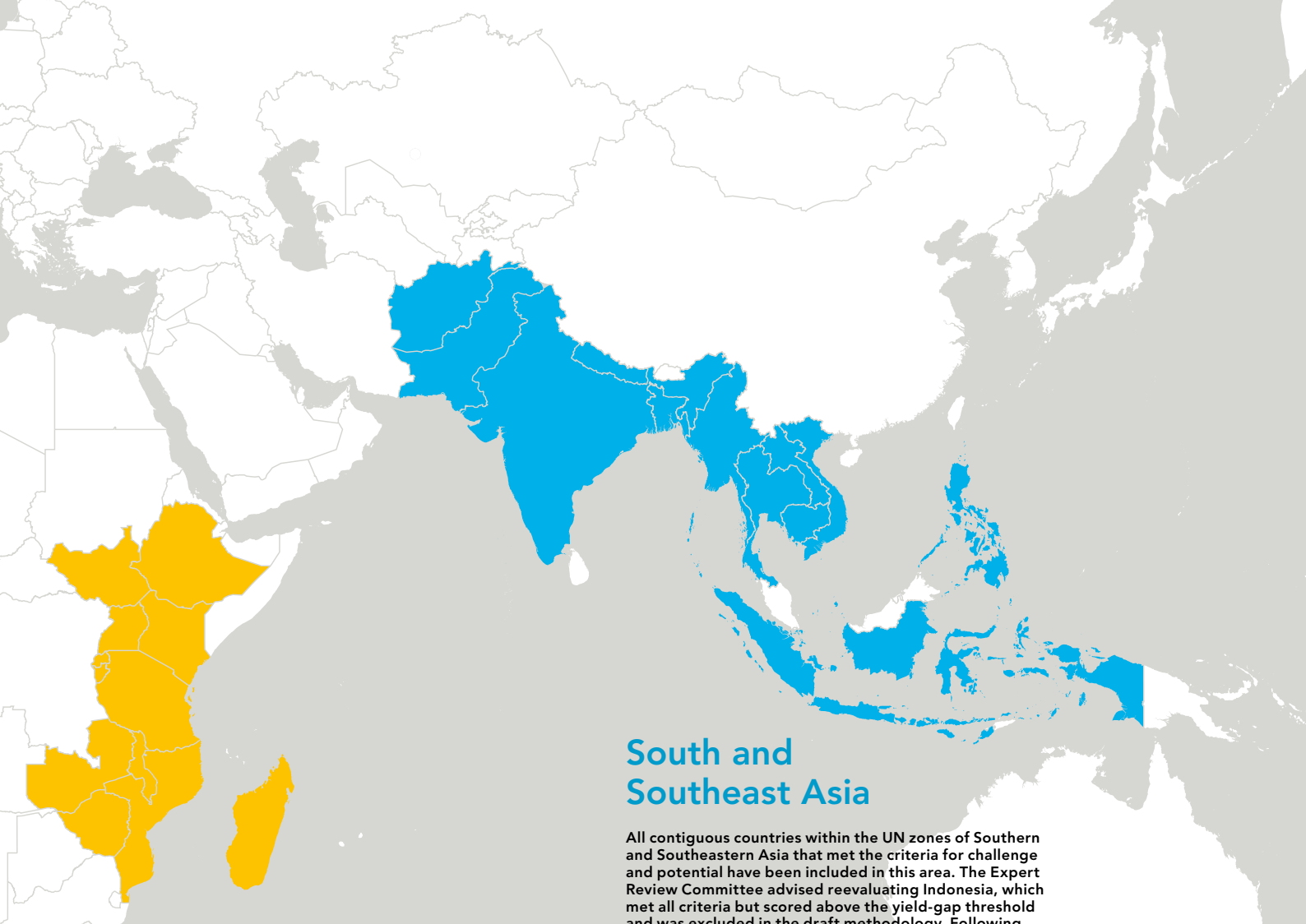
Criteria for Index Area Selection

Challenge

Criterion	Source	Threshold
Food insecurity	Global Hunger Index 2013 (IFPRI)	>5.5
Smallholder farmers growing target crops	Spatial Production Allocation Model 2000 (IFPRI)	Subsistence and low-input
Yield gap	Global Agro-Ecological Zones v3.0 (IIASA/FAO)	<55%

Potential

Criterion	Source	Threshold
Crop suitability	Global Suitability Index (IIASA/FAO)	>25
Share of cropland	World Soil Database	>5% (IIASA/FAO)
Market accessibility	Travel time to major city (IRC/LRM)	<4 hours



Eastern Africa

The area in this region corresponds with the boundaries of the United Nations geoscheme. Following this scheme, the Democratic Republic of the Congo, which also met the criteria in a small part of the country, is excluded. Djibouti, Eritrea and Somalia are out of scope since they do not fit the crop suitability criterion. This country selection was also applied for the Regional Access to Seeds Index for Eastern Africa.

Index countries: Burundi, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, South Sudan, Tanzania, Uganda, Zambia and Zimbabwe.

South and Southeast Asia

All contiguous countries within the UN zones of Southern and Southeastern Asia that met the criteria for challenge and potential have been included in this area. The Expert Review Committee advised reevaluating Indonesia, which met all criteria but scored above the yield-gap threshold and was excluded in the draft methodology. Following additional advice from external experts, the Access to Seeds Foundation decided to include Indonesia.

Index countries: Afghanistan, Bangladesh, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Philippines, Thailand and Vietnam.

3.3. Crop Scope

Global Index

Determined primarily by the needs and business models of smallholder farmers, the crop scope of the Global Access to Seeds Index encompasses both field and vegetable crops. This is with the exception of oil crops such as canola and raw material crops such as cotton. Lists of global field and vegetable crops – relevant for the regions and likely to be in the current portfolio of seed companies – were composed based on the area harvested. Stakeholders also proposed the inclusion of local crops, which are important at the local level but currently sparse in the portfolio of commercial seed companies.

Depending on the production systems and agricultural conditions in which they operate, it may be advantageous for some smallholder farmers to focus on a single field or vegetable crop. Other farmers choose a mixed model of field and vegetable crops to spread risks or supply the market as well as their own family and community. Both field and vegetable crops are necessary for global food and nutrition security.

As local crops form an important part of farmers' business models, despite currently being neglected in breeding programs and commercial seed production, stakeholders suggested including these crops to encourage seed company activities in this area. Local crops are often referred to as 'neglected and underutilized species' or 'orphan crops'. Since they may be anything but underutilized at a local level, the Index methodology considers 'local crops' to be crops that are currently found to a limited extent in the portfolio of the commercial seed sector versus 'global crops' that are currently in the portfolio of seed companies. It is likely that more can be expected initially from seed companies for crops that are already in their portfolio.

Global Field Crops

The list of global crops was compiled from two sources. Annex 1 of the International Treaty on Plant Genetic Resources for Food and Agriculture lists the common crops regarded as vital for global food security. This list, however, is not exhaustive and many vegetable crops in particular are missing. Using FAOSTAT data, Annex 1 of the International Treaty was matched with important crops in Index countries in Sub-Saharan Africa, South and Southeast Asia and Latin America, based on arable land. All crops with area harvested over 1 million hectares in these areas combined were selected.

As a result, nine field crops important for smallholder farmers in the Index regions have been identified. These include all field crops that are relevant as a staple crop and, according to input from expert consultations, have potential for commercial breeding. Sorghum and millet are also on the list. These dry land cereals are often referred to as 'neglected and underutilized', but are significant for all Index regions and already present in some seed companies' portfolios.

In accordance with FAOSTAT, the crop list does not differentiate between specific varieties like white or yellow maize or winter and spring wheat. Especially in the case of maize, it is often said that many companies have yellow maize in their portfolio whereas smallholder farmers and their customers prefer white maize. In the case of millets, which are a group of highly variable small-seeded grasses, that do not form a taxonomic group, the three species that are most grown in the Index area are included in the list.

The Access to Seeds Index seeks to evaluate whether companies that have a specific crop in their portfolio, even though varieties do not match smallholder preferences, see opportunities to play a role in developing varieties that are suitable to the conditions and preferences of smallholder farmers.

Global Field Crops

No	Crop	Botanical name	Crop type	Area harvested (ha)
1	Rice, paddy	<i>Oryza sativa</i>	Cereal	105,546,101
2	Maize	<i>Zea mays</i>	Cereal	47,540,063
3	Wheat	<i>Triticum aestivum</i>	Cereal	42,815,450
4	Millets: - Finger millet - Pearl Millet - Foxtail Millet	<i>Eleusine coracana</i> <i>Pennisetum americanum</i> <i>Setaria italica</i>	Cereal	27,196,623
5	Sorghum	<i>Sorghum bicolor</i>	Cereal	23,550,605
6	Beans, dry	<i>Phaseolus vulgaris</i>	Legume	19,142,515
7	Soybean	<i>Glycine max</i>	Legume	16,682,195
8	Potato	<i>Solanum tuberosum</i>	Roots & tubers	4,728,099
9	Barley	<i>Hordeum vulgare</i>	Cereal	2,176,791

(Area Harvested in Target Countries in Sub-Saharan Africa, Latin America, South and Southeast Asia. Source: FAOSTAT, 2013)

Global Vegetable Crops

The global vegetable crop list is mainly compiled from FAOSTAT data as the number of vegetable crops in the International Treaty is limited. Okra, which is high on the list based on area harvested, is often referred to as a 'neglected and underutilized species'. Due to its importance, mainly in West Africa and Southern Asia, and because some companies have it in their portfolio, this vegetable is included on the global list rather than the local crops list. All vegetable crops with an area harvested over 60,000 hectares were selected. Where FAOSTAT combined specific crops within one group, these are listed separately.

○ Global Vegetable Crops

	Crop	Botanical name	Area harvested (ha)
1	Onion	<i>Allium cepa</i>	1,944,703
2	Chili pepper	<i>Capsicum annuum</i>	1,755,171
3	Tomato	<i>Solanum esculentum</i>	1,577,204
4	Okra	<i>Abelmoschus esculentus</i>	978,444
5	Eggplant	<i>Solanum melongena</i>	812,129
6	Pumpkin	<i>Cucurbita maxima</i>	717,331
7	Squash	<i>Cucurbita pepo</i>	
8	Gourd	<i>Cucurbita pepo</i>	
9	Cabbage	<i>Brassica oleracea</i>	658,229
10	Green bean	<i>Phaseolus vulgaris</i>	600,267
11	Sweet pepper	<i>Capsicum annuum</i>	550,051
12	Cauliflower	<i>Brassica oleracea</i> var. <i>botrytis</i>	535,613
13	Broccoli	<i>Brassica oleracea</i> var. <i>italica</i>	
14	Green pea	<i>Pisum sativum</i>	509,935
15	Garlic	<i>Allium sativum</i>	342,365
16	Watermelon	<i>Citrullus lanatus</i>	292,714
17	Lettuce	<i>Lactuca sativa</i>	202,307
18	Chicory	<i>Cichorium intybus</i>	
19	Melon	<i>Cucumis melo</i>	155,012
20	Cucumber	<i>Cucumis sativus</i>	129,365
21	Gherkins	<i>Cucumis sativus</i>	
22	Carrot	<i>Daucus carota</i>	124,136
23	Turnip	<i>Brassica napus</i> subsp. <i>napus</i>	
24	Leek	<i>Allium porrum</i>	76,335
25	Spinach	<i>Spinacia oleracea</i>	69,115

(Area Harvested in Index Countries in Sub-Saharan Africa, Latin America, South and Southeast Asia. Source: FAOSTAT, 2013)

Local Crops

Due to their geographic specificity, a myriad local crops are currently not or included only to a limited extent in the scope of commercial seed companies. Based on expert consultations, an initial list of important local crops was composed. This list is non-exhaustive and only provides an indication of the crops on which seed companies could focus.

Local Crops per Region

	Sub-Saharan Africa	Asia	Latin America
Cereals and pseudo-cereals	Fonio Tef Triticale	Triticale Buckwheat	Quinoa
Legumes	Chickpea Cowpea Lablab Long bean Marama Pigeon pea	Mung bean Chickpea	
Roots & tubers	Sweet potato Yam Cassava		Yacón
Vegetables	Amaranth African eggplant Black nightshade Celery Celosia Egusi melon Moringa Sukuma wiki Gboma West African okra Jew's mallow	Bitter melon Lemongrass Amaranthus Coriander Celery Chinese kale Purslane Palak Fenugreek Kangkong	Papalo

(Non-exhaustive. Source: Expert Consultations, 2013)

Regional Index for Eastern Africa

For reasons of consistency, for the Regional Access to Seeds Index for Eastern Africa the same global crop list for field crops and vegetables is applied as for the Global Index. Even though the areas harvested for some of the crops is limited according to FAOSTAT, all crops are grown in the region. In addition, based on stakeholder consultations and the farmers' focus groups, a list of five priority local crops for field crops and vegetables was composed.

Global Field Crops

No	Crop	Botanical name	Area harvested (ha)
1	Rice, paddy	<i>Oryza sativa</i>	2,877,488
2	Maize	<i>Zea mays</i>	15,326,327
3	Wheat	<i>Triticum aestivum</i>	2,010,120
4	Millets: - Finger millet - Pearl millet - Foxtail millet	<i>Eleusine coracana</i> <i>Pennisetum americanum</i> <i>Setaria italica</i>	1,416,155
5	Sorghum	<i>Sorghum bicolor</i>	4,236,167
6	Beans, dry	<i>Phaseolus vulgaris</i>	5,868,875
7	Soybean	<i>Glycine max</i>	481,321
8	Potato	<i>Solanum tuberosum</i>	977,984
9	Barley	<i>Hordeum vulgare</i>	1,062,080

Local Field Crops

1	Chickpea	<i>Cicer arietinum</i>	482,952
2	Cowpea	<i>Vigna unguiculata</i>	928,579
3	Tef	<i>Eragrostis tef</i>	n/a
4	Pigeon pea	<i>Cajanus cajan</i>	742,935
5	Lablab (Dolichos)	<i>Lablab purpureus</i>	n/a

(Area Harvested in Index Countries in Eastern Africa. Source: FAOSTAT, 2013)

Global Vegetable Crops

No	Crop	Botanical name	Area harvested (ha)
1	Onion	<i>Alium cepa</i>	139,910
2	Chili pepper	<i>Capsicum annuum</i>	372,550
3	Tomato	<i>Solanum esculentum</i>	114,387
4	Okra	<i>Abelmoschus esculentus</i>	437
5	Eggplant	<i>Solanum melongena</i>	6400
6	Pumpkin	<i>Cucurbita maxima</i>	46600
7	Squash	<i>Cucurbita pepo</i>	
8	Gourd	<i>Cucurbita pepo</i>	
9	Cabbage	<i>Brassica oleracea</i>	74,700
10	Green bean	<i>Phaseolus vulgaris</i>	7,979
11	Sweet pepper	<i>Capsicum annuum</i>	148,512
12	Cauliflower	<i>Brassica oleracea</i> var. <i>botrytis</i>	148
13	Broccoli	<i>Brassica oleracea</i> var. <i>italica</i>	
14	Green pea	<i>Pisum sativum</i>	21,488
15	Garlic	<i>Allium sativum</i>	22,573
16	Watermelon	<i>Citrullus lanatus</i>	4,600
17	Lettuce	<i>Lectuca sativa</i>	1,450
18	Chicory	<i>Cichorium intybus</i>	
19	Melon	<i>Cucumis melo</i>	30
20	Cucumber	<i>Cucumis sativus</i>	916
21	Gherkins	<i>Cucumis sativus</i>	
22	Carrot	<i>Daucus carota</i>	9,233
23	Turnip	<i>Brassica napus</i> subsp. <i>napus</i>	
24	Leek	<i>Allium porrum</i>	15,630
25	Spinach	<i>Spinacia oleracea</i>	4,241

Local Vegetable Crops

1	Amaranth	<i>Amaranthus</i> spp.	n/a
2	Black nightshade	<i>Solanum nigrum</i>	n/a
3	Spider plant	<i>Cleome gynandra</i>	n/a
4	Jew's mallow	<i>Corchorus olitorius</i>	n/a
5	Crotalaria	<i>Crotalaria ochroleuca</i> & <i>C. brevidens</i>	n/a

(Area Harvested in Index Countries in Eastern Africa. Source: FAOSTAT, 2013)



Irrigation

Mahamadi Ganemtoire from Burkina Faso irrigates his small farm with water pumped from a nearby dam reservoir. Improved smallholder irrigation can be a key drought mitigation measure. The most successful technologies are those that improve existing farming systems rather than introduce radically new ideas.

4. Approach to Weighting and Scoring

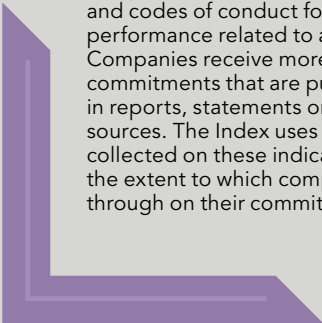
Companies are assessed and ranked using a weighted scorecard approach. Under each measurement area, companies are assessed with indicators classified along four lines: Commitment, Performance, Transparency and Innovation. Under these measurement areas there is a total of 73 indicators for the Global Access to Seeds Index and 62 indicators for the Regional Access to Seeds Index for Eastern Africa.

4.1. Four Categories of Indicators

The Index is a relative ranking, which compares companies with each other rather than against an absolute, ideal state. The highest attainable scores for each indicator do not reflect an optimal characteristic of industry behavior, but the degree to which a company meets predetermined stakeholder expectations. Additionally, companies do not receive negative scores in indicators, meaning that they can never score below zero.


Each measurement area is assessed with indicators classified in four categories: Commitment, Performance, Transparency and Innovation. Commitment is the first step to actualizing practice as it defines what a company values and aims to achieve, for example through a code of conduct, policy or as a signatory to international agreements. Performance measures what companies actually do, which has the greatest impact on access to seeds. Transparency surrounding policies and practices shows the company's intent and allows it to be held accountable for its actions and values. Finally, Innovation captures how companies create or employ new means to advance and lead industry practice to promote access to seeds.

1. Commitment



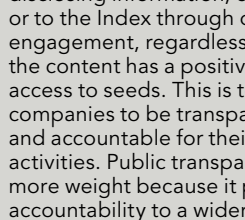
This indicator category measures company values, strategies, policies and codes of conduct for improving performance related to access to seeds. Companies receive more credit for commitments that are publicly available in reports, statements or other verifiable sources. The Index uses information collected on these indicators to track the extent to which companies follow through on their commitments.

2. Performance




This indicator category focuses on what companies are actually doing to promote access to seeds through the implementation of initiatives within the seven measurement areas. It shows where companies put policies and priorities into action to achieve what they committed to do.

3. Transparency



This indicator category focuses on the extent to which companies disclose information regarding their access to seeds initiatives. They receive credit for disclosing information, either publicly or to the Index through one-on-one engagement, regardless of whether the content has a positive impact on access to seeds. This is to encourage companies to be transparent about and accountable for their policies and activities. Public transparency is given more weight because it promotes accountability to a wider audience.

4. Innovation



As the seed industry as a whole looks for ways to enter new markets and address current industry challenges, companies can develop innovative strategies and models that make access to seeds more sustainable. This indicator category measures what companies do to shape their core competencies to improve access to seeds. It identifies the industry as an important driver of change, recognizing that it operates within an environment where multiple actors may influence the access to seeds landscape.

4.2. Weighted Scorecard Approach

All seven measurement areas consist of indicators in the four categories Commitment, Performance, Transparency and Innovation. Each category within a measurement area forms an indicator group. Within each group, indicator weight is distributed evenly.

Each indicator is assigned a score according to pre-set scoring criteria. Based on the scores of individual indicators, the weighted sum of scores of an indicator group is aggregated. The score per measurement area is then determined by the weighted sum of scores per category. A company's final overall score is the weighted sum of scores per measurement area.

This approach results in an overall score for each company as well as a score per measurement area and category. Consequently, leadership in different fields can be identified. The company with the highest overall score may top the list, but others may lead in a specific measurement area, such as Research and Development, or a specific indicator category, such as Transparency.

Scores can also be calculated for broader themes, such as a company's contribution to sustainable intensification, which is reflected in several indicators across different measurement areas.

4.3. Approach to Weighting

The allocation of weight across the seven measurement areas and four indicator categories was made based on a consideration of the following:

1. Stakeholder priorities.

Extensive input on the methodology was received through stakeholder consultation, which contributed both to the creation and definition of the measurement areas and to the relative importance assigned to each.

2. Business activities that have the greatest potential impact.

While international seed companies engage in a variety of business activities that can have an impact on smallholder farmers, some of those activities have greater impact potential than others. For example, their R&D expertise and capabilities – a core business activity of all companies in the Index – create great opportunities to increase smallholders' access to seeds of varieties appropriate to their needs.

3. Performance outcomes over commitment.

While all four indicator categories are important, greater weight is given to Performance, as it tracks a company's actual practices and programs 'on the ground'. These are regarded as having the greatest potential impact on access to seeds for smallholder farmers. In contrast, Innovation has been assigned relatively little weight, as indicators in this category will be used as an additional means to highlight innovative practices already tracked under other categories. Based on expert feedback and analyst insights, those practices and approaches that are deemed innovative will be scored under this category.

4. Different priorities at the global and regional level.

Stakeholder consultations in the region revealed the relative importance of the measurement areas Marketing and Sales and Capacity Building. To reflect this, the weighting distribution of the Regional Index differs slightly from the Global Index. Additionally, the Regional Index gives more weight to performance indicators.

○ Weighting Distribution Global Index

Indicator Categories



○ Weighting Distribution Regional Index for Eastern Africa

Indicator Categories



4.4. Approach to Scoring

Scoring takes place at the indicator level, and indicator scores are aggregated by calculating weighted sums as described above. Scoring criteria have been developed for each indicator and are designed to highlight leading practices within the industry. The scoring range for all indicators is zero to ten.

For indicators that assess policies, management systems and programs, non-disclosure by a company results in a score of zero.

Among the seed companies in the Access to Seeds Index, there is considerable variation with respect to size, countries of operation and business models. Such variation has implications for scoring. For some indicators, such as Commitment, differences among companies have no bearing on the approach to scoring. Companies can make certain commitments regardless of the size and scope of their operations.

For other indicators, size and scope do matter. Smaller firms have less extensive operations and often fewer resources to dedicate to certain programs, for example. In assessing performance on quantitative measures, we address these differences by taking a scaled approach to scoring. This may mean, for example, normalizing a company's performance, such as the extent of certain programs or the number of improved crop varieties that it has introduced in Index countries, based on its revenues (size) or on the relevance of its crop portfolio (scope).

In addition, variation in business models may mean that certain indicators or elements of indicators are not applicable to some companies. In these cases, an indicator that is not applicable receives a weight of zero, and its original weight is distributed among the remaining indicators in its group.

4.5. Types of Scoring Criteria

The Index assesses companies using three types of scoring criteria:

1. Cumulative

Cumulative scoring criteria identify specific elements on which companies are scored. These may include elements or aspects of a policy or management system, for example. Companies receive points for each element that is in place in the policy or system.

2. Scaled

A scaled approach to scoring is used for indicators for which quantitative data is relevant, such as the number of varieties useful to smallholder farmers that a company has developed. Scaling is used to normalize quantitative data on a scale of zero to ten while taking into account factors such as the size of the company.

Scoring Criteria

3. Qualitative

Qualitative scoring criteria are used to score performance on indicators, such as programs and initiatives, for which the details may vary significantly among companies and for which there are no pre-established elements to be scored or definitions of best practice. The qualitative criteria may include the comprehensiveness of a program or initiative, its presumed level of positive impact, its level of innovation, etc. Such qualitative assessments can usually be carried out only after company data has been collected and is available to compare across companies.

A qualitative approach is also used to assess controversial company practices that are considered to be detrimental to the goal of improving access to seeds for smallholder farmers, such as misleading marketing or involvement in bribery and corruption. Some measurement areas, including Genetic Resources and Intellectual Property and Marketing and Sales, have indicators that focus on such practices. For these indicators, if there is no evidence of involvement in practices considered to be detrimental, companies receive full points for the indicator.



Female Farmer

Maria Francisco Mutuque in one of her fields in Mozambique. A recent World Bank study found that, although half of Africa's farmers are women, their productivity is significantly lower per hectare than men's. The FAO estimates that if women had the same access to resources, their yields could increase by up to 30%.

5. Methodology Global Index

The Access to Seeds Index uses a framework that allows for benchmarking, comparison and trend analysis over time. The framework is composed of seven measurement areas identified by stakeholders as those in which companies can play a positive role in increasing access to seeds for smallholder farmers.

A. Governance and Strategy

This measurement area focuses on the integration of access to seeds issues into companies' core policies, strategies, governance structures and management systems. The objective of this measurement area is to capture companies' overall commitment to global food and nutrition security, and, more specifically, their commitment to smallholder farmer development, by sharing their knowledge, technologies, varieties and seeds. The Index seeks to understand the strategic reasoning behind companies' access to seeds initiatives, as they tend to be most effective and sustainable when developed as part of a clear corporate strategy.

Global Food and Nutrition Security

Seed companies can contribute in many ways to the global food and nutrition security agenda and sustainable intensification of agriculture, including outside the Index regions. The incorporation of global food and nutrition security issues into company policy shows the company's willingness to contribute to these issues. A clear strategy drives company actions and enables partners to engage with the company and stakeholders to hold the company accountable.

Access to Seeds for Smallholder Farmers

Seed companies can contribute to smallholder farmer development by increasing smallholder farmers' access to knowledge, technologies, varieties and seeds, thereby enhancing their productivity in a sustainable way. A clear commitment and strategy to help improve the situation of smallholder farmers explicates how companies can contribute based on their portfolios, assets and capabilities.

Governance and Accountability

Improving access to seeds requires governance structures that build accountability and incentivize companies to fulfill their commitments to food and nutrition security and smallholder farmers. Assigning responsibility and accountability for access to seeds to the board or senior executives helps to ensure that such commitments are integrated into companies' corporate strategies. Clearly formulated goals and targets, supported by incentives to reward activities that promote access to seeds or global food and nutrition security more generally, can improve implementation and assessment.



Indicators Global Index 2016

A.I Commitment

- A.I.1 **Global Food and Nutrition Security**
The company has a policy statement in which it articulates a commitment and strategy to enhance global food and nutrition security.
- A.I.2 **Access to Seeds for Smallholder Farmers**
The company has a commitment and strategy to contribute to sustainable intensification and improved access to seeds for smallholder farmers in Index countries.

A.II Performance

- A.II.1 **Governance and Accountability**
The company has management structures in place to implement and measure outcomes of its programs and activities related to access to seeds for smallholder farmers in Index countries.
- A.II.2 **Management Incentives**
The company has systems in place to incentivize management to advance its strategy and goals regarding access to seeds for smallholder farmers in Index countries.
- A.II.3 **Programs and Resources**
The company's dedicated programs and allocation of resources demonstrate a strategic and proactive approach to increasing smallholder farmers' access to seeds in Index countries.

A.III Transparency

- A.III.1 **Reporting on Commitments and Strategy**
The company reports publicly on its commitments and strategy related to global food and nutrition security, sustainable intensification and improving access to seeds for smallholder farmers in Index countries.

A.IV Innovation

- A.IV.1 **Innovation in Access to Seeds Strategies**
The company has established innovative strategies and approaches to improve smallholder farmers' access to seeds in Index countries.

B. Public Policy and Stakeholder Engagement

This measurement area seeks to capture how companies engage with policymakers and other stakeholders to influence national and international policies and markets in ways that can affect access to seeds for smallholder farmers. Companies can be actively involved in collaborative initiatives, international alliances or seed associations that play a role in seed sector development in Index regions.

Industry Engagement

Companies are in a position to promote awareness of the role that the seed industry can play in smallholder farmer development through access to seeds. Through active membership in seed associations and industry organizations, including participation on boards, in relevant committees and working groups, seed companies can contribute to greater understanding of the specific needs of smallholder farmers in Index countries and the opportunities to participate in solutions.

Multi-stakeholder Initiatives

In order to contribute to global food security and improved access to seeds, it is important that seed companies engage and collaborate with stakeholders, including universities, international research organizations, farmer organizations, local and international NGOs and industry peers. An example of such collaboration is the establishment of public-private partnerships or participation in international alliances.

Lobbying and Public Dialogue

Seed companies have a significant influence on public policy matters relevant to access to seeds. Many stakeholders stress that lobbying activities in Index countries should go through national trade associations. The policy positions that companies advocate through their lobbying activities, as well as their participation in trade associations, think tanks, interest groups or other organizations, are an important element of their contribution to global food security and access to seeds. It is important that companies be transparent about their lobbying activities and their membership in and financial support for trade associations and other organizations that advocate public policy positions that may impact access to seeds. Moreover, seed companies are in a position to engage actively in the public debate on global food security.



Indicators Global Index 2016

B.I Commitment

- B.I.1 Stakeholder and Industry Engagement**
The company commits to work with stakeholders – such as governments, industry peers, universities, national and international research organizations, farmer organizations, and local and international NGOs – with the goal of creating an enabling environment for access to seeds for smallholder farmers in Index countries.
- B.I.2 Policy on Political Involvement**
The company has a policy statement governing its lobbying activities and political involvement in Index countries.

B.II Performance

- B.II.1 Public Policy Advocacy**
In its public policy advocacy the company takes into account the interests of smallholder farmers in Index countries.
- B.II.2 Participation in Multi-stakeholder Initiatives**
The company participates in international multi-stakeholder initiatives that support improving access to seeds for smallholder farmers in Index countries.
- B.II.3 Participation in Public and Industry Dialogue**
Senior executives at the company are actively involved in public and industry dialogue on access to seeds in particular.
- B.II.4 Breaches, Bribery and Corruption**
There is no evidence that the company has breached local regulations or international standards with a potential negative impact for access to seeds for smallholder farmers in Index countries or has been involved in bribery and corruption.

B.III Transparency

- B.III.1 Lobbying Positions**
The company publicly discloses its lobbying positions on public policy matters that may impact access to seeds for smallholder farmers in Index countries.
- B.III.2 Membership and Support**
The company publicly discloses its membership in and financial support for trade associations, think tanks, interest groups, or other organizations that advocate public policy positions at national, regional or international levels and that may impact access to seeds for smallholder farmers in Index countries.

B.IV Innovation

- B.IV.1 Innovation in Public and Stakeholder Engagement**
The company has adopted an innovative approach to public policy advocacy and stakeholder engagement that contributes to an enabling environment for smallholder farmers.

C. Genetic Resources and Intellectual Property

Access to genetic resources is vital for seed companies and smallholder farmers to develop new varieties. At the same time, intellectual property (IP) protection enables companies to generate a return on R&D investment through licensing. IP protection can, however, have implications for established smallholder practices such as farm-saved seeds and the breeders' exemption. This measurement area therefore seeks to clarify and assess the positions of companies on these issues.

Conservation and Use of Crop and Genetic Diversity

The growth of the formal seed sector can reduce the local crop diversity currently conserved in situ by farmers and communities. Seed companies can help preserve local crop diversity and the informal seed system by supporting public gene banks for ex situ conservation and community seed banks for in situ conservation. Additionally, companies can help preserve agricultural diversity e.g. by engaging with local governments, supporting the Global Crop Diversity Trust and the International Treaty for Plant Genetic Resources for Food and Agriculture and continuing to breed using local varieties from public and private gene banks.

Access to Genetic Resources

Access to genetic resources is important for breeding companies, public research institutes and smallholder farmers to develop varieties that are tailored to local conditions and crop preferences. Support for public gene banks and community seed banks, access to company gene banks and commercial varieties for further breeding can all facilitate the development of new varieties appropriate for smallholder farmers.

Intellectual Property Rights

The handling of intellectual property rights can significantly impact access to seeds for smallholder farmers. The long-established breeders' exemption makes commercial varieties available for further breeding; the farmers' privilege allows on-farm seed saving. This access can be restricted, for instance by the use of contractual clauses and patents not just on plant varieties but also on traits, methods and technologies. Conversely, specific licensing strategies can improve access to patented varieties, traits, methods and technologies for national agricultural research institutes and private plant breeders to develop new varieties appropriate to the needs of smallholder farmers.



Indicators Global Index 2016

C.I Commitment

C.I.1 Conservation and Use of Crop and Genetic Diversity

The company is committed to the conservation and use of a diverse set of crops and genetic resources in Index countries.

C.I.2 Intellectual Property Protection

The company commits not to restrict the use of its commercial varieties for further breeding suitable for smallholder farmers in Index countries and not to restrict the use of farm-saved seeds by such farmers.

C.II Performance

C.II.1 Conservation and Use of Genetic Resources

The company is involved in programs and/or initiatives that encourage the conservation and use of a diverse set of crops and genetic resources in Index countries.

C.II.2 Support for Public Gene Banks

The company supports - through monetary and/or in-kind contributions - public gene banks and/or global funds and initiatives serving public gene banks in Index countries.

C.II.3 Access to Company Genetic Resources

The company gives access to its own genetic resources for the purpose of breeding crops tailored to the needs of smallholder farmers in Index countries.

C.II.4 Licensing

The company has provisions to apply humanitarian licensing when relevant for smallholder farmers in Index countries.

C.II.5 Use of Commercial Genetic Material

There is no evidence that the company has blocked the use of its commercial genetic material for further breeding in Index countries.

C.II.6 Recognition of Farm-saved Seeds

There is no evidence that the company has blocked the use of farm-saved seeds by smallholder farmers in Index countries.

C.II.7 Benefit Sharing

The company contributes to the Benefit-sharing Fund created by the International Treaty on Plant Genetic Resources for Food and Agriculture.

C.III Transparency

C.III.1 Positions on Genetic Resources and IP

The company discloses its policies and practices regarding access to genetic resources and intellectual property.

C.IV Innovation

C.IV.1 Innovation in Genetic Resources and IP

The company has adopted innovative models for sharing genetic resources and/or providing access to its intellectual property.

D. Research and Development

This measurement area focuses on companies' research and development efforts, especially activities that consider local conditions in Index regions and the key crops for farmers in those regions. These activities include adapting global crops for local use and breeding programs aimed at improving e.g. the yield, pest and disease resistance and climate resilience of local crops. Additional activities, such as cooperation with local and/or public research institutes for the development of new varieties, evaluation of the needs of local farmers and consumers and the development of appropriate seed treatment and other technologies, are also considered.

Improved Varieties for Smallholder Farmers

Plant-breeding activities tailored to the needs and preferences of smallholder farmers in Index regions demonstrate the company's commitment to the development of improved varieties. By conducting variety trials and on-farm demonstrations, companies can test varieties in their existing portfolio for suitability in Index regions. They can also contribute to the availability of improved varieties in Index regions through dedicated breeding programs or targeted approaches in their general breeding programs focusing on both global and local crops.

Specific Traits for Smallholder Farmers

Dedicated programs to develop specific traits with tolerance to abiotic stresses such as heat, drought, flooding and salinization and the biotic stresses of pests and diseases can significantly improve crop yield and performance. Such traits can subsequently be used in breeding programs with local varieties for Index countries. Similarly, the development of improved varieties with specific traits that increase the nutritional value of crops can contribute greatly to food and nutrition security.

Local Cooperation

Specific needs, preferences and knowledge can be incorporated into companies' breeding programs by involving local farmers, consumers and other stakeholders in the variety selection through variety trials and demonstrations. Similarly, cooperation with local research institutes and farmer organizations can be of tremendous value. In some cases, local research institutes may already have developed germplasm that is available for use in breeding programs.



Indicators Global Index 2016

D.I Commitment

D.I.1 Improved Varieties for Smallholder Farmers
The company commits to the development and/or testing of varieties appropriate to the local conditions and preferences of smallholder farmers in Index countries.

D.I.2 Breeding Program for Specific Traits
The company commits to developing specific traits also useful to smallholder farmers in Index countries, such as traits that increase crop robustness, climate change resilience or nutritional value.

D.II Performance

D.II.1 Testing of Existing Portfolio
The company makes an effort to test its existing varieties for suitability to smallholder farmers in Index countries.

D.II.2 Developing Improved Varieties of Global Crops
The company has a breeding program that aims to develop varieties of global crops appropriate to the local conditions and preferences of smallholder farmers in Index countries.

D.II.3 Developing Improved Varieties of Local Crops
The company's breeding program includes the development of varieties of local crops appropriate to the local conditions and preferences of smallholder farmers in Index countries.

D.II.4 Breeding Program for Specific Traits
The company's breeding program includes the development of specific traits useful to smallholder farmers in Index countries, such as traits that increase crop robustness, climate change resilience or nutritional value.

D.II.5 R&D Budget
The company allocates a portion of its R&D budget to the development of varieties/traits and/or the improvement of seed quality in order to meet the needs of smallholder farmers in Index countries.

D.II.6 Local Knowledge and Feedback
The company has mechanisms in place to ensure that the knowledge, preferences and feedback of local consumers, traders and smallholder farmers are incorporated into its breeding programs in Index countries.

D.II.7 Collaborative Research
The company is involved in collaborative research with local public or private partners such as research institutes, non-governmental organizations and/or farmer organizations in Index countries.

D.III Transparency

D.III.1 Transparency in R&D
The company reports publicly on its R&D efforts that address the needs of smallholder farmers in Index countries.

D.IV Innovation

D.IV.1 Innovation in R&D
The company has adopted an innovative R&D approach to develop varieties and/or traits useful to smallholder farmers in Index countries.

E. Marketing and Sales

This measurement area assesses the ways in which companies make quality seeds of improved varieties available and affordable to smallholder farmers and promote adoption. This could include tailored packaging and trusted distribution networks. Promotion of new varieties can be done through demonstrations and on-farm trials, which help to raise awareness among smallholder farmers of advancements in breeding and the use of other inputs. Other relevant practices are similar to those used in developed countries, including professional testing of varieties before release, quality assurance and after-sales support systems.

Release of New Varieties

New varieties are most beneficial when tailored to the needs of smallholder farmers in Index countries. These varieties may be the result of companies' global breeding programs or varieties that were developed by companies' local breeding programs or local research institutes. Smallholder farmers often use open-pollinated varieties (OPVs), from which they can save seeds for their own use in the next growing season. This seed-saving system is not technically possible with F1 hybrids, which are the commercial standard for many crops because they produce better yields. The indicators consider how companies deal with this issue and whether they accommodate the differing capacity levels of smallholder farmers.

Quality of Varieties and Seeds

Most Index countries have legislation and regulations regarding quality control and the testing of new varieties and seed lots, but the capacity of the national institution to implement the regulations is weak or in some cases nonexistent. It is the role of seed companies to ensure that only varieties suited to local conditions are released into the market, and that the seeds of these varieties meet certain minimum standards. This can be done through professional variety testing and adherence to internationally adopted quality control protocols and codes, for example on biosafety. Seed quality should also be maintained throughout the distribution channel.

Packaging, Distribution and Affordability

When entering a new market, an existing distribution network can be used or new distribution channels can be created. This is of particular relevance when trying to reach smallholder farmers in remote regions. Depending on the local situation, it may be necessary to target specific groups such as female farmers and youth, who play a significant role in agricultural production and increasing agricultural productivity. Distribution channels must be robust and reliable in order to minimize the sale of counterfeit seeds. Training distributors in inventory management and taking responsibility for the distribution channel can prevent misuse. The packaging should include clear instructions and warnings in the local language and in pictograms. Finally, smallholder farmers generally require smaller quantities of seeds and a pricing strategy adapted to their local situation. Affordability can also be improved when breeding companies partner with other organizations to introduce finance or insurance services.

Adoption Strategies and Access to Adjacent Technologies

A promotional strategy, including field days and initiatives targeting lead farmers, which improves local knowledge about different varieties and their potential should be implemented. During demonstrations and on-farm trials, the use of adjacent technologies such as agrochemicals, fertilizers and irrigation can be introduced. Since some of the companies in the scope are also leading suppliers of agrochemicals, these companies should ensure that only registered pesticides are promoted and protocols on pesticide safety are complied with.

After-sales Support

In order to ensure that the varieties and seeds they produce meet local needs and demands, companies should have customer feedback and grievance mechanisms in place. This feedback can serve as an important part of the learning process for breeders.



Indicators

Global Index 2016

E.I	Commitment	E.II.9	Affordability
E.I.1	Marketing of Commercial Varieties The company has made a commitment to market in Index countries its varieties and seeds that are appropriate to the needs of smallholder farmers in Index countries.	E.II.9	The company is involved in programs – either directly or through partnerships – to help make seeds more affordable to smallholder farmers in Index countries, such as financing or insurance services or differential pricing schemes.
E.I.2	Quality and Safety of Varieties and Seeds The company has policies and protocols in accordance with international best practice to ensure biosafety, product suitability and product quality when marketing quality seeds of improved varieties in Index countries.	E.II.10	After Sales Support and Stewardship The company has customer feedback and grievance mechanisms available to smallholder farmers in Index countries.
E.I.3	Marketing Policy The company has a policy or code of conduct that governs its marketing activities in Index countries.	E.II.11	Marketing Practices There is no evidence that the company has engaged in misleading marketing practices in Index countries.
E.II	Performance	E.III	Transparency
E.II.1	Marketing of Commercial Varieties The company distributes, directly or through partnerships, licensing, or other mechanisms, varieties suitable to the conditions and preferences of smallholder farmers in Index countries.	E.III.1	Transparency in Marketing & Sales The company reports publicly on its marketing and sales practices in Index countries.
E.II.2	Marketing Varieties of Research Institutes The company assists in bringing the varieties of international or national research institutes to markets in Index countries.	E.IV	Innovation
E.II.3	Accommodating the Differing Capacity Levels of Smallholder Farmers Through its marketing practices in Index countries the company accommodates the differing capacity levels of smallholder farmers.	E.IV.1	Innovation in Marketing & Sales The company has introduced innovative approaches to the testing, distribution, promotion and adoption of seed products, which may support the sustainable delivery of such products in Index countries.
E.II.4	Distribution Channels The company has established distribution channels in Index countries that effectively make its seeds accessible to smallholder farmers, including in remote areas.		
E.II.5	Packaging and Labeling The company packages its products in quantities appropriate to the needs of smallholder farmers in Index countries and its packaging includes information in a local language and pictograms.		
E.II.6	Other Agricultural Inputs The company makes an effort to help ensure that smallholder farmers in Index countries have access to necessary agricultural inputs other than seed and learn about their appropriate and sustainable use.		
E.II.7	Quality Assurance The company has implemented management systems to ensure that its seed quality is maintained throughout the distribution system and that counterfeit seeds are not sold under its brand in Index countries.		
E.II.8	Adoption Strategies The company has programs, such as field days or other demonstration services, to promote the adoption of suitable improved varieties by smallholder farmers in Index countries.		

F. Capacity Building

This measurement area focuses on the ways in which seed companies invest in local capacity building to ensure that farmers have the right knowledge and tools to realize the full potential of quality seeds of improved varieties. Offering or participating in extension services and agronomic training and education such as field schools can help achieve this goal. This area presents many opportunities for public-private partnerships.

Capacity Building

Activities that build the capacity of smallholder farmers and farmer cooperatives include extension services, training and educational programs. The development of such activities and programs shows the willingness of companies to invest in the capacities of smallholder farmers and to help improve the yield and performance of local crops. Extension services can be offered by companies themselves or in partnership with local organizations. Training and educational programs for smallholders, such as field schools and field days, can be organized for specific target groups such as women, young farmers or community trainers. Seed companies can connect different programs and topics so that technical expertise and adjacent technologies are included in extension services. (Mobile) ICT applications that provide agronomic support and advice to farmers deserve a special mention.

Farmer Organizations

Farmer organizations can help smallholders to acquire skills, to access financial and agricultural inputs such as credit, seeds and fertilizers, and to process and market their products more effectively through the development of linkages to output markets.

Access to Output Markets

Most farmers grow crops not only for their own use but also for commercial sale. Breeding companies can help farmers to increase the profitability of their business by linking them to output markets and assisting in the development of a local or regional market. Additionally, companies can partner with other organizations to offer farmers training on post-harvest handling and product hygiene.



Indicators Global Index 2016

F.I	Commitment
F.I.1	Capacity Building The company commits to assisting smallholder farmers in Index countries to increase their productivity and income in a sustainable manner.
F.II	Performance
F.II.1	Agricultural Advisory Services The company offers, directly or through local public or private partners, agricultural advisory/extension services to smallholder farmers in Index countries and helps to transform and improve their use of agricultural technologies in accordance with the principles of sustainable intensification.
F.II.2	Farmer Education The company contributes to formal agricultural education programs and/or institutions, including those for next generation farmers in Index countries.
F.II.3	ICT The company supports, directly or through partnerships, initiatives that advance the use of information and communications technology by smallholder farmers in Index countries to help build their capacity and inform their decision-making.
F.II.4	Programs for Female Farmers The company supports programs, directly or through partnerships, that are specifically designed to build capacity among female farmers in Index countries to access and utilize seeds and adjacent technologies.
F.II.5	Farmer Organizations The company supports, directly or through partnerships, the development of farmer organizations focused on improving agricultural practices in Index countries.
F.II.6	Access to Output Markets The company is engaged in developing the food value chain through its involvement, directly or through partnerships, in collaborative initiatives that link smallholder farmers in Index countries to output markets.
F.III	Transparency
F.III.1	Transparency in Capacity Building The company publicly reports on its programs to assist in building capacity among smallholder farmers in Index countries.
F.IV	Innovation
F.IV.1	Innovation in Capacity Building The company has introduced innovative approaches to build capacity among smallholder farmers, promoting and enabling the use of quality seeds of improved varieties and adjacent technologies in Index countries.

G. Local Seed Sector Advancement

This measurement area seeks to capture the extent to which seed companies are involved in advancing a professional seed sector on a local level. Companies can contribute to the development of the technical capacity of national agricultural research institutes and training in specific areas for the national seed certification agency. In addition, seed companies have extensive skills and experience in research, seed production and value chains that can be very useful for building a national seed industry. Sharing these skills can be important for developing national seed associations and seed companies, and for the emergence of farmers as local seed suppliers.

Recognition of Local Seed Sectors

Local and informal seed sectors play a vital role in Index countries as they provide a significant share of the seeds used by smallholder farmers. Recognition of this role reflects the commitment to the food security of smallholder farmers who continue to rely on informal seed sectors for a large number of crops.

Advancing Local Seed Sectors

Seed companies can have a beneficial impact on the development of local formal seed sectors by introducing new technologies and expertise as well as actively participating in national and regional seed trade associations. Seed companies can also operate through and help strengthen the national seed association or assist in establishing one if it does not exist.

Local Seed Production

Seed companies can encourage local seed production in Index countries by enabling smallholder farmers to produce seeds under fair conditions. Working with local seed growers generates incomes and contributes to capacity building. The construction of local production facilities can also create employment opportunities and encourage knowledge transfer. Through partnerships with local seed companies, these facilities can access advanced technologies and expertise.

Supporting Certification and Registration Systems

Seed production registration and certification systems are often weak or underdeveloped in Index countries. Seed companies can help to develop these systems by offering technical training, thereby sharing knowledge of and experience with registration systems in other countries.

Advancing Local Research Institutes

Seed companies can enhance local research capacity in seed sectors in Index countries by providing local organizations with resources or knowledge through training. Partnering with local institutions such as national agricultural research institutes and universities to establish R&D-focused activities can achieve this. Another possibility is to improve variety testing by training stakeholders, including public breeding institutions and other governmental agencies. Training local employees in breeding techniques and variety testing can indirectly influence the advancement of local research institutes and breeding companies through knowledge transfer.



Indicators Global Index 2016

G.I Commitment

- G.I.1 **Informal Seed Systems**
In its policy statements the company recognizes the role and importance of informal seed systems in Index countries.
- G.I.2 **Seed Sector Development**
The company commits to helping to advance the development of the seed sector in Index countries.

G.II Performance

- G.II.1 **Smallholder Farmers in Value Chain**
The company involves smallholder farmers in its seed production activities in Index countries.
- G.II.2 **Local Seed Industry**
The company supports the development of the local seed industry in Index countries through, for example, cooperation and partnerships with local seed companies.
- G.II.3 **Registration and Certification Systems**
The company supports government efforts in Index countries to improve systems and standards that affect local seed quality and variety registration.
- G.II.4 **Local Research Institutes**
The company supports the development of local research capacity in the seed sectors in Index countries.
- G.II.5 **Quality Management in Seed Production**
The company has management systems in place to ensure quality throughout its seed production processes in Index countries.
- G.II.6 **Social Standards in Seed Production**
The company has social standards in place to ensure fair labor conditions in the production of its seeds in Index countries.

G.III Transparency

- G.III.1 **Transparency in Local Seed Sector Development**
The company discloses publicly its policies and approaches to advance local seed sectors in Index countries.

G.IV Innovation

- G.IV.1 **Innovation in Capacity Enhancement**
The company has introduced innovative approaches to local seed sector advancement in Index countries.



Information Technology

John Wahngombe from Kinangop North, Kenya, checks agricultural product prices on his cell phone in Nairobi before selling his crops to a middleman. The use of ICT by smallholder farmers is increasingly impacting agricultural production and incomes. Farmers can access information and share knowledge while seed companies use text messages to reach their customers.

6. Methodology Regional Index

The Regional Index measures company activity in the same seven measurement areas as the Global Index. This is with the exception of the last measurement area, where the Regional Index focuses on seed production rather than local seed sector advancement.

A. Governance and Strategy

This measurement area focuses on the integration of access to seeds issues into companies' core policies, strategies, governance structures and management systems. The objective of this measurement area is to capture companies' overall commitment to smallholder farmer development, by sharing their knowledge, technologies, varieties and seeds. The Index seeks to understand the strategic reasoning behind companies' access to seeds initiatives, as they tend to be most effective and sustainable when developed as part of a clear corporate strategy.

Access to Seeds for Smallholder Farmers

Seed companies can contribute to smallholder farmer development by increasing smallholder farmers' access to knowledge, technologies, varieties and seeds, thereby enhancing their productivity in a sustainable way. A clear commitment coupled with programs and resources to help improve the situation of smallholder farmers explicates how companies can contribute based on their portfolios, assets and capabilities.



Indicators Regional Index 2016

A. I Commitment

A.I.1 Access to Seeds for Smallholder Farmers
The company has a commitment and strategy to contribute to sustainable intensification and improved access to seeds for smallholder farmers in Index countries.

A.II Performance

A.II.1 Governance and Accountability
The company has management structures in place to implement and measure outcomes of its programs and activities related to access to seeds for smallholder farmers in Index countries.

A.II.2 Programs and Resources
The company's dedicated programs and allocation of resources demonstrate a strategic and proactive approach to increasing smallholder farmers' access to seeds in Index countries.

A.III Transparency

A.III.1 Reporting on Commitments and Strategy
The company reports publicly on its commitments and strategy related to sustainable intensification and improving access to seeds for smallholder farmers in Index countries.

A.IV Innovation

A.IV.1 Innovation in Access to Seeds Strategies
The company has established innovative strategies and approaches to improve smallholder farmers' access to seeds in Index countries.

B. Public Policy and Stakeholder Engagement

This measurement area seeks to capture how companies engage with policymakers and other stakeholders to influence national, regional and international policies and markets in ways that can affect access to seeds for smallholder farmers. Companies can be actively involved in collaborative initiatives, international alliances or seed associations that play a role in seed sector development in the regional Index region.

Industry Engagement

Companies are in a position to promote awareness of the role that the seed industry can play in smallholder farmer development through access to seeds. Through active membership in seed associations and industry organizations, including participation on boards, in relevant committees and working groups, seed companies can contribute to greater understanding of the specific needs of smallholder farmers in Index countries and the opportunities to participate in solutions.

Multi-stakeholder Initiatives

In order to contribute to global food security and improved access to seeds, it is important that seed companies engage and collaborate with stakeholders, including universities, international research organizations, farmer organizations, local and international NGOs and industry peers. An example of such collaboration is the establishment of public-private partnerships or participation in international alliances.

Lobbying and Public Dialogue

Seed companies have a significant influence on public policy matters relevant to access to seeds. Many stakeholders stress that lobbying activities in Index countries should go through national trade associations. The policy positions that companies advocate through their lobbying activities, as well as their participation in trade associations, think tanks, interest groups or other organizations, are an important element of their contribution to access to seeds. It is important that companies be transparent about their lobbying activities and their membership in and financial support for trade associations and other organizations that advocate public policy positions that may impact access to seeds. Moreover, seed companies are in a position to engage actively in the public debate on global food security.



Indicators Regional Index 2016

B.I Commitment

- B.I.1 Stakeholder and Industry Engagement**
The company commits to work with stakeholders – such as governments, industry peers, universities, national and international research organizations, farmer organizations, and local and international NGOs – with the goal of creating an enabling environment for access to seeds for smallholder farmers in Index countries.

B.II Performance

- B.II.1 Public Policy Advocacy**
In its public policy advocacy the company takes into account the interests of smallholder farmers in Index countries.
- B.II.2 Participation in Multi-stakeholder Initiatives**
The company participates in multi-stakeholder initiatives that support improving access to seeds for smallholder farmers in Index countries.
- B.II.3 Participation in Industry Associations**
Directly or through its membership in trade associations, the company is actively involved in industry dialogue on access to seeds for smallholder farmers in Index countries.
- B.II.4 Participation in International Dialogue**
The company takes initiative to give the regional industry a voice in international forums and policy-making processes.

B.III Transparency

- B.III.1 Membership and Support**
The company publicly discloses its membership in and financial support for trade associations, think tanks, interest groups, or other organizations that advocate public policy positions at national, regional or international levels and that may impact access to seeds for smallholder farmers in Index countries.

B.IV Innovation

- B.IV.1 Innovation in Public Policy and Stakeholder Engagement**
The company has adopted an innovative approach to public policy advocacy and stakeholder engagement that contributes to an enabling environment for smallholder farmers.

C. Genetic Resources and Intellectual Property

Access to genetic resources is vital for seed companies and smallholder farmers to develop new varieties. At the same time, intellectual property (IP) protection enables companies to generate a return on R&D investment through licensing. IP protection can, however, have implications for established smallholder practices such as farm-saved seeds and the breeders' exemption. This measurement area therefore seeks to clarify and assess the positions of companies on these issues.

Conservation and Use of Crop and Genetic Diversity

The growth of the formal seed sector can reduce the local crop diversity currently conserved in situ by farmers and communities. Seed companies can help preserve local crop diversity and the informal seed system by supporting public gene banks for ex situ conservation and community seed banks for in situ conservation. Additionally, companies can help preserve agricultural diversity e.g. by engaging with local governments, supporting the Global Crop Diversity Trust and the International Treaty for Plant Genetic Resources for Food and Agriculture and continuing to breed using local varieties from public and private gene banks.

Access to Genetic Resources

Access to genetic resources is important for breeding companies, public research institutes and smallholder farmers to develop varieties that are tailored to local conditions and crop preferences. Support for public gene banks and community seed banks, access to company gene banks and commercial varieties for further breeding can all facilitate the development of new varieties appropriate for smallholder farmers.

Intellectual Property Rights

The handling of intellectual property rights can significantly impact access to seeds for smallholder farmers. The long-established breeders' exemption makes commercial varieties available for further breeding; the farmers' privilege allows on-farm seed saving. This access can be restricted, for instance by the use of contractual clauses and patents not just on plant varieties but also on traits, methods and technologies. Conversely, specific licensing strategies can improve access to patented varieties, traits, methods and technologies for national agricultural research institutes and private plant breeders to develop new varieties appropriate to the needs of smallholder farmers.



Indicators Regional Index 2016

C.I Commitment

C.I.1 Conservation and Use of Crop and Genetic Diversity

The company is committed to the conservation and use of a diverse set of crops and genetic resources in Index countries.

C.I.2 Intellectual Property Protection

The company commits not to restrict the use of its commercial varieties for further breeding suitable for smallholder farmers in Index countries and not to restrict the use of farm-saved seeds by such farmers.

C.II Performance

C.II.1 Conservation and Use of Genetic Resources

The company is involved in programs and/or initiatives that encourage the conservation and use of a diverse set of crops and genetic resources in Index countries.

C.II.2 Support for Public Gene Banks

The company supports - through monetary and/or in-kind contributions - public gene banks and/or global funds and initiatives serving public gene banks in Index countries.

C.II.3 Access to Company Genetic Resources

The company gives access to its own genetic resources for the purpose of breeding crops tailored to the needs of smallholder farmers in Index countries.

C.II.4 Use of Commercial Genetic Material

There is no evidence that the company has blocked the use of its commercial genetic material for further breeding.

C.II.5 Recognition of Farm-saved Seeds

There is no evidence that the company has blocked the use of farm-saved seeds by smallholder farmers in Index countries.

C.III Transparency

C.III.1 Positions on Genetic Resources and IP

The company discloses its policies and practices regarding access to genetic resources and intellectual property.

C.IV Innovation

C.IV.1 Innovation in Genetic Resources and IP

The company has adopted innovative models for sharing genetic resources and/or providing access to its intellectual property.

D. Research and Development

This measurement area focuses on companies' research and development efforts, including through partnerships with (local) research institutes, especially activities that consider local conditions in the Index region and the key crops for farmers in this region. These activities include adapting global crops for local use and breeding programs aimed at improving e.g. the yield, pest and disease resistance and climate resilience of local crops.

Improved Varieties for Smallholder Farmers

Plant-breeding activities tailored to the needs and preferences of smallholder farmers in Index regions demonstrate companies' commitment to the development of improved varieties.

By conducting variety trials and on-farm demonstrations, companies can test varieties in their existing portfolio for suitability in the Index region. They can also contribute to the availability of improved varieties in Index regions through dedicated breeding programs or targeted approaches in their general breeding programs focusing on both global and local crops.

Specific Traits for Smallholder Farmers

Dedicated programs to develop specific traits with tolerance to abiotic stresses such as heat, drought, flooding and salinization and the biotic stresses of pests and diseases can significantly improve crop yield and performance. Such traits can subsequently be used in breeding programs with local varieties for Index countries. Similarly, the development of improved varieties with specific traits that increase the nutritional value of crops can contribute greatly to food and nutrition security.

Local Cooperation

Specific needs, preferences and knowledge can be incorporated into companies' breeding programs by involving local farmers, consumers and other stakeholders in the variety selection through variety trials and demonstrations. Similarly, cooperation with local research institutes and farmer organizations can be of tremendous value. In some cases, local research institutes may already have developed germplasm that is available for use in breeding programs.



Indicators Regional Index 2016

D.I Commitment

D.I.1 Improved Varieties for Smallholder Farmers
The company commits to the development and/or testing of varieties appropriate to the local conditions and preferences of smallholder farmers in Index countries.

D.I.2 Breeding Program for Specific Traits
The company commits to developing specific traits also useful to smallholder farmers in Index countries, such as traits that increase crop robustness, climate change resilience or nutritional value.

D.II Performance

D.II.1 Developing Improved Varieties of Global Crops
The company has a breeding program and/or testing program that aims to develop specific varieties of global crops appropriate to the local conditions and preferences of smallholder farmers in Index countries.

D.II.2 Developing Improved Varieties of Local Crops
The company's breeding program includes the development of varieties of local crops appropriate to the local conditions and preferences of smallholder farmers in Index countries.

D.II.3 Breeding Program for Specific Traits
The company's breeding program includes the development of specific traits useful to smallholder farmers in Index countries, such as traits that increase crop robustness, climate change resilience or nutritional value.

D.II.4 R&D Budget
The company allocates a portion of its R&D budget to the development of varieties/traits and/or the improvement of seed quality in order to meet the needs of smallholder farmers in Index countries.

D.II.5 Local Knowledge and Feedback
The company has mechanisms in place to ensure that the knowledge, preferences and feedback of local consumers, traders and smallholder farmers are incorporated into its breeding programs in Index countries.

D.II.6 Collaborative Research
The company is involved in collaborative research with local public or private partners such as research institutes, non-governmental organizations and/or farmer organizations in Index countries.

D.III Transparency

D.III.1 Transparency in R&D
The company reports publicly on its R&D efforts that address the needs of smallholder farmers in Index countries.

D.IV Innovation

D.IV.1 Innovation in R&D
The company has adopted an innovative R&D approach to develop varieties and/or traits useful for smallholder farmers in Index countries.

E. Marketing and Sales

This measurement area assesses the ways in which companies make quality seeds of improved varieties available and affordable to smallholder farmers and promote adoption. This could include tailored packaging and trusted distribution networks. Promotion of new varieties can be done through demonstrations and on-farm trials, which help to raise awareness among smallholder farmers of advancements in breeding and the use of other inputs. Other relevant practices are similar to those used in developed countries, including professional testing of varieties before release, quality assurance and after-sales support systems.

Release of New Varieties

New varieties are most beneficial when tailored to the needs of smallholder farmers in Index countries. These varieties may be the result of companies' global breeding programs or varieties that were developed by companies' local breeding programs or local research institutes. Smallholder farmers often use open-pollinated varieties (OPVs), from which they can save seeds for their own use in the next growing season. This seed-saving system is not technically possible with F1 hybrids, which are the commercial standard for many crops because they produce better yields. The indicators consider how companies deal with this issue and whether they accommodate the differing capacity levels of smallholder farmers.

Quality of Varieties and Seeds

Various Index countries have legislation and regulations regarding quality control and the testing of new varieties and seed lots, but the capacity of the national institution to implement the regulations is weak or in some cases nonexistent. It is the role of seed companies to ensure that only varieties suited to local conditions are released into the market, and that the seeds of these varieties meet certain minimum standards. This can be done through professional variety testing and adherence to internationally adopted quality control protocols and codes, for example on biosafety. Seed quality should also be maintained throughout the distribution channel.

Packaging, Distribution and Affordability

When entering a new market, an existing distribution network can be used or new distribution channels can be created. This is of particular relevance when trying to reach smallholder farmers in remote regions. Depending on the local situation, it may be necessary to target specific groups such as female farmers and youth, who play a significant role in agricultural production and increasing agricultural productivity. Distribution channels must be robust and reliable in order to minimize the sale of counterfeit seeds. Training distributors in inventory management and taking responsibility for the distribution channel can prevent misuse. The packaging should include clear instructions and warnings in the local language and in pictograms. Finally, smallholder farmers generally require smaller quantities of seeds and a pricing strategy adapted to their local situation. Affordability can also be improved when breeding companies partner with other organizations to introduce finance or insurance services.

Adoption Strategies and Access to Adjacent Technologies

A promotional strategy, including field days and initiatives targeting lead farmers, which improves local knowledge about different varieties and their potential should be implemented. During demonstrations and on-farm trials, the use of adjacent technologies such as agrochemicals, fertilizers and irrigation can be introduced. Since some of the companies in the scope are also leading suppliers of agrochemicals, these companies should ensure that only registered pesticides are promoted and protocols on pesticide safety are complied with.

After-sales Support

In order to ensure that the varieties and seeds they produce meet local needs and demands, companies should have customer feedback and grievance mechanisms in place. This feedback can serve as an important part of the learning process for breeders.



Indicators Regional Index 2016

<p>E.I</p> <hr/> <p>E.I.1</p>	<p>Commitment</p> <p>Quality and Safety of Varieties and Seeds The company has policies and protocols in accordance with international best practice to ensure biosafety, product suitability and product quality when marketing quality seeds of improved varieties in Index countries.</p>	<p>E.II.10</p>	<p>After Sales Support and Stewardship The company has customer feedback and grievance mechanisms available to smallholder farmers in Index countries.</p>
<p>E.II</p> <hr/> <p>E.II.1</p> <p>E.II.2</p> <p>E.II.3</p> <p>E.II.4</p> <p>E.II.5</p> <p>E.II.6</p> <p>E.II.7</p> <p>E.II.8</p> <p>E.II.9</p>	<p>Performance</p> <p>Marketing of Commercial Varieties The company distributes, directly or through partnerships, licensing, or other mechanisms, varieties suitable to the conditions and preferences of smallholder farmers and appropriate for specific agro-ecological zones in Index countries.</p> <p>Marketing Varieties of Research Institutes The company assists in bringing the varieties of international or national research institutes to markets in Index countries.</p> <p>Accommodating the Differing Capacity Levels of Smallholder Farmers Through its marketing practices in Index countries the company accommodates the differing capacity levels of smallholder farmers.</p> <p>Distribution Channels The company has established distribution channels in Index countries that effectively make its seeds accessible to smallholder farmers, including in remote areas.</p> <p>Packaging and Labeling The company packages its products in quantities appropriate to the needs of smallholder farmers in Index countries and its packaging includes information in a local language and in pictograms.</p> <p>Other Agricultural Inputs The company makes an effort to help ensure that smallholder farmers in Index countries have access to necessary agricultural inputs other than seed and learn about their appropriate and sustainable use.</p> <p>Quality Assurance The company has implemented management systems to ensure that its seed quality is maintained throughout the distribution system and that counterfeit seeds are not sold under its brand in Index countries.</p> <p>Adoption Strategies The company has programs, such as field days or other demonstration services, to promote the adoption of suitable improved varieties by smallholder farmers in Index countries.</p> <p>Affordability The company is involved in programs – either directly or through partnerships – to help make seeds more affordable to smallholder farmers in Index countries, such as financing or insurance services or differential pricing schemes.</p>	<p>E.II.11</p>	<p>Marketing Practices There is no evidence that the company has engaged in misleading marketing practices in Index countries.</p>
		<p>E.III</p> <hr/> <p>E.III.1</p>	<p>Transparency</p> <p>Transparency in Marketing & Sales The company reports publicly on its marketing and sales practices in Index countries.</p>
		<p>E.IV</p> <hr/> <p>E.IV.1</p>	<p>Innovation</p> <p>Innovation in Marketing & Sales The company has introduced innovative approaches to the testing, distribution, promotion and adoption of seed products, which may support the sustainable delivery of such products in Index countries.</p>

F. Capacity Building

This measurement area focuses on the ways in which seed companies invest in local capacity building to ensure that farmers, including those in remote areas, have the right knowledge and tools to realize the full potential of quality seeds of improved varieties. Offering or participating in extension services and agronomic training and education such as field schools can help achieve this goal. This area presents many opportunities for public-private partnerships.

Capacity Building

Activities that build the capacity of smallholder farmers and farmer cooperatives include extension services, training and educational programs. The development of such activities and programs shows the willingness of companies to invest in the capacities of smallholder farmers and to help improve the yield and performance of local crops. Extension services can be offered by companies themselves or in partnership with local organizations. Training and educational programs for smallholders, such as field schools and field days, can be organized for specific target groups such as women, young farmers or community trainers. Seed companies can connect different programs and topics so that technical expertise and adjacent technologies are included in extension services. (Mobile) ICT applications that provide agronomic support and advice to farmers deserve a special mention.

Farmer Organizations

Farmer organizations can help smallholders to acquire skills, to access financial and agricultural inputs such as credit, seeds and fertilizers, and to process and market their products more effectively through the development of linkages to output markets.

Access to Output Markets

Most farmers grow crops not only for their own use but also for commercial sale. Breeding companies can help farmers to increase the profitability of their business by linking them to output markets and assisting in the development of a local or regional market. Additionally, companies can partner with other organizations to offer farmers training on post-harvest handling and product hygiene.



Indicators Regional Index 2016

F.I Commitment

F.I.1 Capacity Building

The company commits to assisting smallholder farmers in Index countries to increase their productivity and income in a sustainable manner.

F.II Performance

F.II.1 Agricultural Advisory Services

The company offers, directly or through local public or private partners, agricultural advisory/extension services to smallholder farmers in Index countries and helps to transform and improve their use of agricultural technologies in accordance with the principles of sustainable intensification.

F.II.2 Farmer Education

The company contributes to formal agricultural education programs and/or institutions, including those for next generation farmers in Index countries.

F.II.3 ICT

The company supports, directly or through partnerships, initiatives that advance the use of information and communications technology by smallholder farmers in Index countries to help build their capacity and inform their decision-making.

F.II.4 Programs for Female Farmers

The company supports programs, directly or through partnerships, that are specifically designed to build capacity among female farmers in Index countries to access and utilize seeds and adjacent technologies.

F.II.5 Farmer Organizations

The company supports, directly or through partnerships, the development of farmer organizations focused on improving agricultural practices in Index countries.

F.II.6 Access to Output Markets

The company is engaged in developing the food value chain through its involvement, directly or through partnerships, in collaborative initiatives that link smallholder farmers in Index countries to output markets.

F.III Transparency

F.III.1 Transparency in Capacity Building

The company publicly reports on its programs to assist in building capacity among smallholder farmers in Index countries.

F.IV Innovation

F.IV.1 Innovation in Capacity Building

The company has introduced innovative approaches to build capacity among smallholder farmers, promoting and enabling the use of quality seeds of improved varieties and adjacent technologies in Index countries.

G. Production

The limited availability of quality seeds is a major constraint for smallholder farmers in the Index region. Local seed production can address this issue by improving local access to appropriate, affordable seeds on a continuous basis. This measurement area seeks to identify whether seed companies produce seeds locally and the extent to which smallholder farmers are involved in this process.

Local Seed Production

Seed companies can encourage local seed production in Index countries by enabling smallholder farmers to produce seeds under fair conditions. Working with local seed growers generates incomes and contributes to capacity building. The construction of local production facilities can also create employment opportunities and encourage knowledge transfer. Through partnerships with local seed companies, these facilities can access advanced technologies and expertise.

Maintenance Programs and Quality Management

Seed quality can be influenced by a variety of factors. To ensure the consistent quality of basic seed of old varieties, seed companies or their subcontractors can implement robust maintenance programs during (local) seed production as well as management systems in the later phases of planting, harvesting, processing, storing and packaging.



Indicators Regional Index 2016

G.I Commitment

- G.I.1 **Smallholders in the Value Chain**
The company commits to produce its seeds locally when possible and involve smallholder farmers in its local production in Index countries.

G.II Performance

- G.II.1 **Regional Production**
The company has seed production activities in the Index region.
- G.II.2 **Smallholder Farmers in the Value Chain**
The company involves smallholder farmers in its seed production activities in Index countries.
- G.II.3 **Maintenance Programs**
The company has a program to maintain the quality of basic seed of old varieties during seed production in Index countries.
- G.II.4 **Quality Management in Seed Production**
The company has management systems in place to ensure quality throughout its seed production processes in Index countries.
- G.II.5 **Social Standards in Seed Production**
The company has social standards in place to ensure fair labor conditions in the production of its seeds in Index countries.

G.III Transparency

- G.III.1 **Transparency in Production**
The company publicly reports on its seed production activities in Index countries.

G.IV Innovation

- G.IV.1 **Innovation in Seed Production**
The company has introduced innovative approaches to its local seed production and the involvement of smallholder farmers in Index countries.



Dryland Cereals

Men load a wagon with millet on the outskirts of Maradi, Niger. Dryland cereals like pearl millet are drought tolerant and are often the only crops available to smallholders in arid regions. They are highly nutritious, easy to produce and have multiple uses (food, fodder, biofuel, beverages), offering farmers many business opportunities.

Annex I Review and Consultations

The draft Methodology Report for the Access to Seeds Index 2016 was published on the website of the Access to Seeds Foundation on November 3, 2014. The Expert Review Committee (ERC) provided feedback on the report on November 17, 2014. The draft methodology was also presented at the FAO on December 11, 2014.

All feedback was compiled and used to finalize the Methodology Report. An overview is given per section of the main input and the manner in which it was incorporated in the report.

General

The introductory chapters were reviewed and more emphasis was placed on the role of the Access to Seeds Index and less on the challenge of global food and nutrition security. It goes without saying that seed companies cannot address this challenge alone. Global food and nutrition security is the higher goal of the Index; the efforts of seed companies are one part of a broader solution.

A chapter was added on the approach to weighting and scoring. This approach also takes into account the relative sizes of companies by normalizing a company's performance.

The impact of company activities is not yet taken into account. The first Access to Seeds Index is considered a baseline measurement. The potential impact can be considered in subsequent Index cycles.

To minimize the burden on companies, the number of indicators and questions has been thoroughly reviewed. Furthermore, before the data collection commences, companies receive a questionnaire prepopulated with data that is publicly available.

Efforts by seed companies that correspond with the goal of the Index but fall outside of its scope can be highlighted in the company profile in the Index Report. However, they play no part in the weighting and scoring as the focus of the Index is on Index regions.

Activities by company foundations will be considered in the evaluation of a company's activities.

Index Framework

In response to feedback from companies, the Index gives companies the opportunity to provide information under a non-disclosure agreement. It should, however, be noted that this may affect the scoring on the Transparency indicators.

With the indicators on Innovation, the Index seeks to highlight new or unique practices in the industry. To this end, sector experts, who have signed a non-disclosure agreement, will support the Access to Seeds Index in identifying such practices.

Sustainable intensification has been a driver of the methodology development from the start. To make this explicit, it has been added as a fifth principle.

As the Index acknowledges the significant role governments play in creating an enabling environment for companies in Index countries, this is reflected in the principle Farmer Development. The role of governments will also be taken into account in the dialogue on the Index findings, based on research from other sources like the World Bank.

For consistency, the UN geoscheme was used to delineate the geographic zones in all regions. This has had no effect on the countries in the scope.

Following ERC discussion, external experts were consulted on how to handle the fact that seed company portfolios may include varieties that do not match smallholder preferences, such as yellow versus white maize. Based on that consultation, clarity on how these companies are evaluated, is provided in the section on the crop scope.

Following expert advice, Indonesia was added to the Index region South and Southeast Asia. Similarly, the Access to Seeds Foundation decided not to include Malaysia and South Africa, as some companies and stakeholders had suggested.

Measurement Areas

A. Governance and Strategy

- The indicators were rephrased, putting more emphasis on access to seeds for smallholder farmers in particular instead of global food and nutrition security in general.
- Stakeholders questioned the relevance of the first indicator on the commitment to global food and nutrition security. This indicator resulted from the industry roundtable in which companies noted that they could contribute to this goal in other ways than through activities focusing on smallholder farmers. This indicator can create transparency on those other efforts and give companies credit for them.
- To reduce the number of indicators, the indicator on targets was deleted and incorporated in the other indicators in this measurement area.

B. Public Policy and Stakeholder Engagement

- In response to ERC discussion, the indicator on public policy advocacy was rephrased to capture lobbying activities that support access to seeds for smallholder farmers.
- The ERC discussed that lobbying by companies should take place through national seed trade associations. This is addressed in the questionnaire and is part of the scaling of B.II.1.
- The importance of compliance with biosafety standards was raised during the review of this area. This is now incorporated in measurement areas E. Marketing and Sales and G. Local Seed Sector Advancement.

C. Genetic Resources and Intellectual Property

- References to the UPOV 91 Convention were deleted as most countries in the scope are not members of UPOV. Discussions on the definition of the Convention also directed attention away from the focus of the indicator and caused confusion. Subsequently, more general definitions for the farmers' privilege and breeders' exemption have been used.
- The indicators in this measurement area were reviewed, clarifying that companies are assessed on activities relevant to access to seeds for smallholder farmers in Index countries, rather than their approach to genetic resources and IP in other markets.

D. Research and Development

- On the advice of the ERC, the indicator on seed quality enhancement was deleted, as was the indicator on the incorporation of inbred lines from public research institutes. The latter is already addressed in measurement area E.
- The ERC discussed the responsibility of seed companies to mitigate risk when introducing new varieties in emerging markets. For reasons of clarity, this is included in measurement area E. Marketing and Sales.

E. Marketing and Sales

- Some indicators in this measurement area can be gender specific. This issue is therefore included in the indicators on distribution channels (E.II.4) and adoption strategies (E.II.8).
- Following ERC discussion, the indicator on packaging was broadened to packaging and labeling.
- Following ERC discussion, the indicator on OPVs was rephrased. The indicator now addresses if and how companies accommodate differences in capacity levels among smallholder farmers (E.II.3).
- On the advice of the ERC, the indicator on agricultural inputs was revised to focus on supporting the appropriate use of agricultural inputs (E.II.6).

F. Capacity Building

- Following feedback from stakeholders, the indicator on programs for specific target groups was rephrased as an indicator focusing on female farmers.
- The indicator on farmer education focuses on next-generation farmers, without specific reference to the use of other agricultural inputs.

G. Advancement of the Local Seed Sector

- Following ERC discussion, the specific reference to formal seed sector development was deleted and replaced by the more general seed sector development.
- Following feedback from stakeholders, local seed companies replaced the reference to local seed enterprises.
- Following feedback from stakeholders, two additional indicators on standards and quality management in local seed production were included.

Acronyms

ARIPO	African Regional Intellectual Property Organization
ATSI	Access to Seeds Index
CEO	Chief executive officer
CHE	Switzerland
CIMMYT	International Maize and Wheat Improvement Center
COMESA	Common Market for Eastern and Southern Africa
CSR	Corporate social responsibility
DG	Directorate-general
EAC	East African Community
ECOWAS	Economic Community of West African States
ERC	Expert Review Committee
EU	European Union
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FDI	Foreign direct investment
FRA	France
GAEZ	Global Agro-Ecological Zones
DEU	Germany
GMO	Genetically modified organism
Ha	Hectare
ICT	Information and communications technology
IFPRI	International Food Policy Research Institute
IIASA	International Institute for Applied Systems Analysis
IP	Intellectual property
IPR	Intellectual property rights
ISHI	International Seed Health Initiative
ISTA	International Seed Testing Association
IT-PGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
JPN	Japan
KEN	Kenya
Mln	Million
MWI	Malawi
NARS	National Agricultural Research Systems
NLD	The Netherlands
NGO	Non-governmental organization
PPP	Public-private partnership
PVP	Plant variety protection
R&D	Research and development
SADC	Southern Africa Development Community
SPAM	Spatial Production Allocation Model
THA	Thailand
UGA	Uganda
UNDESA	United Nations Department of Economic and Social Affairs
UPOV	International Union for the Protection of New Varieties of Plants
USA	United States of America
USD (\$)	United States dollar
ZAF	South Africa
ZAM	Zambia
ZWE	Zimbabwe

Definitions

These definitions are meant to provide a clear understanding of phrases used in the Access to Seeds Index and may be updated from time to time.

Access to Seeds Strategy

A strategy that aims to increase access to seeds for smallholder farmers and incorporates the following six dimensions: availability, affordability, suitability, capability, profitability and autonomy. Please refer to the 'Access Dimensions' section for more details.

Adoption Strategy

A strategy that enables smallholder farmers to start using a new agricultural product, for example tailored packaging and the establishment of trusted distribution networks.

Advocacy (1)

Any activity carried out to change public opinion or gain public support.

Agricultural Biodiversity (2)

Agricultural biodiversity is the diversity of crops and their wild relatives, trees, animals, microbes and other species that contribute to agricultural production.

Benefit Sharing (3)

The fair and equitable sharing of benefits derived from the utilization of plant genetic resources obtained from collections under the multilateral system of the IT-PGRFA.

Biosafety System (4)

Any legislation, regulation or policy intended to regulate and control the transfer, handling and use of living modified organisms that may have adverse effects on biological diversity. Such a system aims to ensure the safety of human and animal health and an adequate level of environmental protection.

Breeders' Exemption (5)

Exception to the breeders' rights (see below), allowing plant breeders to use freely plant varieties for propagating new and distinct plant varieties.

Breeders' Rights (5)

Rights granted to the breeder of a new variety of plant that give the breeder exclusive control over the propagating material (including seed, cuttings, divisions, tissue culture) of that new variety for a number of years.

Bribery (6)

The offering, promising, giving, accepting or soliciting of an advantage as an inducement for an action which is illegal, unethical or a breach of trust. Inducements can take the form of gifts, loans, fees, rewards or other advantages (taxes, services, donations, etc.).

Code of Conduct (6)

Statement of principles and values that establishes a set of expectations and standards for how an organization, government body, company, affiliated group or individual will behave, including minimal levels of compliance and disciplinary actions for the organization, its staff and volunteers.

Collaborative Research

Research that involves the cooperation of researchers, institutions, organizations and communities with farmers and/or farmer organizations.

Corruption (6)

The abuse of entrusted power for private gain. Corruption can be classified as grand, petty or political, depending on the amounts of money lost and the sector where it occurs:

- Grand corruption: Acts committed at a high level of government that distort policies or the central functioning of the state, enabling leaders to benefit at the expense of the public good.
- Petty corruption: Everyday abuse of entrusted power by low- and mid-level public officials in their interactions with ordinary citizens, who often are trying to access basic goods or services in places like hospitals, schools, police departments and other agencies.
- Political corruption: Manipulation of policies, institutions and rules of procedure in the allocation of resources and financing by political decision makers, who abuse their position to sustain their power, status and wealth.

Ex Situ Conservation (3)

Conservation of plant genetic resources for food and agriculture outside their natural habitat.

F1 Hybrid

Hybrid of two homozygous parent lines. The F1 hybrid combines desired traits of both parent lines and has a uniform phenotype.

Farm-saved Seed (5)

Seed that is produced on a farm for the purpose of re-sowing on the same farm and not for the purpose of sale.

Farmers' Privilege (5)

The practice by farmers of harvesting and saving seeds for their own use in the next growing season.

Formal Seed System (7, 8)

A framework of institutions, both public and private, and well-defined methodologies, linked together by their involvement in or influence on the multiplication, processing and distribution of improved seed.

Genetic Resources or Germplasm (9)

Any material of plant origin, including reproductive and vegetative propagating material, containing functional units of heredity.

Global Crop Diversity Trust (10)

An independent international fund which has as its objective the provision of a permanent source of funds to support the long-term conservation of ex situ germplasm. This includes characterization, documentation, evaluation and exchange of related information, knowledge and technologies.

Global Field Crops or Staple Crops (11)

Plants grown for food that constitute the dominant part of the human diet and supply a major proportion of energy and nutrient needs.

Global Vegetable Crops (12)

Any of various herbaceous plants having fruit, seeds, roots, tubers, bulbs, stems, leaves or flower parts that are used as food.

Improved Variety (5)

A new variety of plant which produces higher yields, higher quality or provides better resistance to plant pests and diseases while minimizing the pressure on the natural environment.

In Situ Conservation (3)

The conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated plant species, in the surroundings where they have developed their distinctive properties.

Inclusive Business Model (13)

Business model that integrates the poor, either as consumers or as distributors, suppliers or employees.

Index Country

Any country covered by the 2015 Access to Seeds Index. Please refer to the 'Geographic Scope' section for more details.

Informal Seed System (7, 8)

An informally structured mechanism, such as retaining seed on-farm from previous harvests, farmer-to-farmer seed exchange based on barter, social obligation, etc., by which farmers can obtain their seed requirements.

Intellectual Property Rights (IPR) (14, 15)

The rights given to persons over the creation of their minds which the law protects from unauthorized use by others. IP is protected by, for example, patents, copyright and trademarks, which enable the creators to earn recognition or financial benefit from what they invent or create for a certain period of time. Industrial IP is protected primarily to stimulate innovation, design and the creation of technology. In this category fall inventions (protected by patents), industrial designs and trade secrets.

International Treaty (3)

The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), which strives for the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity for sustainable agriculture and food security.

Lobbying (16)

Any activity carried out to influence a government or (public) institution's policies and decisions in favor of a specific cause or outcome.

Local Crops (17, 18)

A diverse set of small crops that tend to be regionally important but are not traded around the world and receive little or no attention from commercial breeding companies. They often have a strong cultural significance and can be vital for the livelihood of smallholder farmers in developing countries. They are often called 'orphan' or 'neglected' crops.

Measurement Area

One of seven measurement areas in which the companies included in the 2015 Index are assessed. These are: governance and strategy, public and stakeholder engagement, genetic resources and intellectual property, research and development, marketing and sales, capacity building and local seed sector development.

Methodology

The Index framework that measures the extent to which the world's leading seed companies use their knowledge, technology, varieties and seeds to benefit smallholder farmers. The Index is guided by five principles, which, through rigorous stakeholder dialogue, led to seven measurement areas in which company activity is assessed. The four principles are: access dimensions, farmer as entrepreneur, farmer development, seed systems and sustainable intensification. The scope of the Index is defined in terms of the companies included, geographic focus and crop selection.

Multilateral System (3)

A structure, provided by the IT-PGRFA, through which participating parties (130 countries and the EU) agree to provide facilitated access to genetic resources for food and agriculture, and to share the benefits arising from the utilization of these resources on a complementary and mutually reinforcing basis.

Multiplication

Seed production.

Open-pollinated Variety (OPV) (19)

A variety naturally cross-pollinated by insects, birds, wind or water or by self-pollination from male and female flower parts on the same plant.

Phytopathological System (20)

Any legislation, regulation or policy having the purpose to prevent the introduction and/or spread of pests of plants and plant products, or to limit the economic impact of regulated non-quarantine pests.

Public Gene Bank (21, 22)

A collection of seeds and other plant reproductive material, primarily of cultivated plants and their wild relatives. The mandate of a gene bank is to conserve these collected plant genetic resources and provide access to them.

Quality Assurance

A set of tests, measures and procedures, normally based on international and/or national certification standards, to assure the consistent quality of seeds throughout the processes of development, testing, production and packaging.

Quality Seed (23)

Seed that consistently meets required standards of genetic and physiological purity (viability and vigor) and good health.

Sustainable Intensification of Agriculture (24)

Increasing yields using fewer resources and minimizing or reversing negative environmental impacts. This can be achieved by making the current agricultural system more efficient through the use of new technologies or by improving current production systems.

Technology (25, 26)

The application of scientific knowledge through which the genetic and physical characteristics of seeds are improved. It involves such activities as variety development, evaluation and release, seed production, seed processing, seed storage, seed testing, seed certification, seed quality control, seed marketing etc.

Variety (3)

Plant grouping, within a single botanical taxon of the lowest known rank, defined by the reproducible expression of its distinguishing and other genetic characteristics.

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Disclaimer

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One of the principles that guide the Access to Seeds Index is 'farmer as entrepreneur'. Smallholder farmers who see themselves as entrepreneurs are more likely to build a business and adopt new technologies. As such, the Index focuses on sustainable business practices and does not emphasize charity or donations by seed companies. The choice of photos in the Methodology Report underlines this. Photography: Hollandse Hoogte.

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