



Sowing the seeds of poverty

**How the World Bank harms
poor farmers**



This CAFOD report shows how the World Bank is promoting regulations and laws that support the expansion of commercial markets for hybrid seeds and chemical inputs like fertilisers and pesticides in Africa. Our research shows how this approach does not support poor smallholder farmers' diverse needs and is not effective in reducing poverty or increasing food security. We outline alternative models, based on agroecological principles, that are more appropriate for supporting farmers to build resilient livelihoods. We are calling on the World Bank to stop promoting a narrow 'one size fits all' model and to start supporting a range of approaches that are vital for tackling poverty and building sustainable food systems.

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Acknowledgements

With thanks to Mark Moreno Pascual at Recourse for background research on the World Bank's Development Policy Lending on agriculture. Thanks to the CAFOD reference group for guidance and reviewing: Louise Abraham, Aisha Dodwell, Louise Eldridge, Graham Gordon, Patrick Kinsella, Diego Martinez Schuett, Andrea Speranza, Neil Thorns. Thanks to Nina Moeller at the Centre for Agroecology, Water and Resilience (CAWR), Coventry University for additional insights and advice. Thanks also to Emma Wakakuwa for a contribution to the text.

24 April 2023

Cover photos, top to bottom:

*A handful of seeds, Sierra Leone.
Photo by Kabba Sulaiman Kargbo*
*Yarie harvests peppers in
Sierra Leone.
Photo by Olusoji Seye*
*Dristy and Rupali farm organically
in Bangladesh.
Photo by Amit Rudro*
*Casiana, Amalia and Victoria from
Bolivia visit a Mayan community
in Guatamala..
Photo by Nikki Evans*

Contents

Executive summary	1
SECTION 1 Seeds are life	5
1.1 Seeds are at the heart of food production	5
1.2 Farmers' access to seed diversity is under threat	8
1.3 Corporate concentration in the agricultural inputs sector	9
SECTION 2 The World Bank's role in promoting industrial agriculture	11
2.1 Distorting markets with subsidies	12
2.2 Forcing countries to implement seed laws	15
2.3 Using flawed metrics	18
2.4 A cheerleader for hybrid seeds and chemical inputs	20
SECTION 3 The World Bank is failing poor smallholder farmers in Africa	22
3.1 Hybrid seeds and chemical inputs are unaffordable for many	22
3.2 Commercial seeds often ignore the needs of women farmers	25
3.3 Chemical inputs can damage soils and pollute water	26
3.4 Seed laws can undermine poor smallholder farmers' access to the seeds they need	27
SECTION 4 The World Bank should support an agroecological transition	32
4.1 It's time for a rethink	32
4.2 The case for agroecology	33
Conclusion and recommendations	38
References	41

Executive summary

Agriculture is a key sector for many countries in the global South and has the potential to be a vital engine to help reduce poverty. In particular, small-scale agriculture has a significant role to play in reducing extreme poverty¹ since 80 per cent of people living below the global poverty line² are based in rural areas, and the vast majority of these depend on agriculture for their livelihoods.³ Small-scale farms are also highly efficient, producing around 35 per cent of global food production on 12 per cent of agricultural land.⁴

Seeds are the starting point for this food production and access to a wide diversity of seeds is vital for farmers to be able to grow the food that is needed for the world's population and to provide nutritious diets for all. Genetic diversity means that crops can adapt to their environment, develop resistance to pests and diseases, and evolve in response to changing conditions including those created by climate change. However, the World Bank is promoting a 'one size fits all' model of agricultural development that benefits large-scale agribusiness at the expense of supporting poor smallholder farmers in many of the world's low- and lower middle-income countries.

CAFOD's analysis shows that the World Bank has made it easier for big agribusinesses to expand their role in markets around the world, to increase the availability of hybrid seeds and chemical fertilisers. Through its policy and funding instruments, the Bank has systematically overlooked support to the wide range of local food and farming systems that are essential when it comes to tackling poverty and the climate crisis, in spite of its mission to end extreme poverty.

Our research focuses mainly on the use of development policy lending and the corresponding 'prior actions' (or conditions) that countries need to take before loans are received from the Bank. We analysed World Bank materials, including policies, project documents and data sets, to find out what conditions the Bank has placed on its loans, over several decades and multiple countries. We examined academic studies and other reports to understand the impacts of these conditions. We focused on countries in Africa because this is the region where the industrial agriculture model is least embedded and where the greatest expansion is happening. We also drew on experience from organisations that CAFOD works with, including from countries where such 'prior actions' were implemented many years ago.

The two main prior actions in agriculture have been subsidy programmes and seed certification laws. Through the **subsidy programmes**, the World Bank has focused almost exclusively on promoting the commercial (or formal) seed market and supporting farmers to buy hybrid seeds and fertilisers. It has ignored the role of the farmer (or informal) seed system in enabling small-scale farmers to tackle poverty and enhance food security. These subsidy programmes are unsustainable in the long-term, a drain on government resources, and lock farmers into relying on unaffordable and environmentally destructive chemical fertilisers.

The second prior action or policy condition used by the World Bank has been the promotion of **seed certification laws**. These laws have made it illegal for local communities to propagate, grow, exchange and sell their own seeds, meaning farmers become more dependent on outside interventions and expensive inputs, including seeds, fertilisers or pesticides. The laws have favoured the certification – and therefore sale and use – of a small range of commercial seeds at the expense of the variety of seeds within farmer-led seed systems. This is happening even though the farmer seed system provides around 80 per cent of farmers' seeds across Africa and is central to tackling poverty and enabling farmers to have greater control over what they grow.

Women farmers are particularly disadvantaged by the shrinking of the farmer seed system because they have less access to finance to buy seeds in commercial markets.

In addition, commercial breeders often do not produce seeds for the crops that women grow for home consumption.

A further issue our research has highlighted in the World Bank's promotion of an industrialised agricultural model is its flawed metrics. Success has been measured by the Bank in terms of greater participation of the private sector in providing access to hybrid seeds and fertilisers, as opposed to measuring impacts based on poverty reduction or increased food security for poor farmers. As a result, large-scale agribusiness companies have been the main beneficiaries of the Bank's involvement, profiting from increased sales and further concentrating their market share and control of agricultural systems.

The results are not surprising. In many cases, the Bank's programmes have not been effective in reducing poverty or increasing food security, nor have they supported diverse seeds, crops and diets that are essential to farmers' livelihoods. Instead of promoting and recognising diverse approaches to agriculture within any given country, the programmes can criminalise farmers for developing and planting the range of seeds they have used for generations. They have also contributed to destroying soil quality and undermining the long-term resilience of farmers to shocks such as climate change and supply chain disruption.

World Bank staff have repeatedly raised concerns about the viability of this model in internal papers and evaluations over the past decades,⁵ yet it remains the dominant approach, based on a persistent narrative that the only way to feed the world is through intensified agriculture.

In contrast to this industrialised agricultural model, diverse local food systems rooted in agroecological approaches are increasingly showing higher crop yields compared with methods that are dependent on chemical inputs, as well as improved soil health and biodiversity. These local food systems are rooted in supporting small-scale farmers' rights over their own seed varieties to ensure long-term food security and climate resilience, yet they receive limited support or interest from either the public or private sector.

It is not enough to balance, in the medium term, the protection of nature with financial gain, or the preservation of the environment with progress... it is a matter of redefining our notion of progress. A technological and economic development which does not leave in its wake a better world and an integrally higher quality of life cannot be considered progress.

Pope Francis, *Laudato Si*, #194, 2015

Box 1 Smallholder farmers reaching urban markets in Brazil

For the past 20 years, CAFOD has been working in Brazil with our local partner organisation – the Pastoral Land Commission of João Pessoa (CPT-JP) – to support small-scale farmers who are running small agroenterprises to produce and market their crops sustainably. Farmers connect directly with urban consumers through local marketing networks such as agroecological fairs. They deliver affordable, safe and nutritious food and create jobs for rural families. CPT-JP also helps farmers to work with local governments to improve their policies. With CPT-JP's support, farmers have negotiated access to the state's local purchasing systems to supply public institutions such as schools. During the Covid-19 pandemic, these marketing networks were vital in helping meet the nutritional needs of poor families when markets were closed. CPT-JP's approach supports both farmers and urban consumers and helps to address structural issues like access to land, contributing to building a sustainable and fair local food economy.

To realise the transformational potential of agriculture and support global efforts to eliminate poverty and build a sustainable food system, these local diverse approaches need to be front and centre of future policy and financial support.

This report takes a detailed look at why the current system is unsustainable, and concludes with four priority areas for action for the World Bank:

- 1. Stop supporting restrictive seed laws:** The World Bank should immediately stop supporting narrow, restrictive seed laws that limit the access of poor smallholder farmers to seeds from both commercial and farmer-led seed systems. Instead, its starting point should be to support policies that uphold farmers' rights to save, share, exchange and sell their seed varieties.
- 2. Invest in an agroecological transition:** There needs to be an immediate and massive repurposing of billions of dollars of public finance away from supporting the industrial agricultural model based on hybrid seeds and chemical fertilisers towards sustainable and resilient production models, based on agroecological principles.
- 3. Support farmer seeds systems:** As part of the agroecological transition, the World Bank needs to scale up its investment in diverse seed systems. This includes supporting the development of a policy environment that recognises and promotes seed diversity and farmer seed systems as well as practical actions, such as supporting participatory plant breeding, community seed banks and other community level initiatives to protect and build crop diversity.
- 4. Measure what matters:** Instead of measuring the increased activity of the private sector in hybrid seed and chemical fertiliser markets as a proxy of agricultural development, the World Bank should measure what matters to farmers. These measures include increased incomes; market access; reduction in levels of poverty, hunger and malnutrition; gender equity; soil and water quality; access to indigenous seeds; and crop diversity.

The UK government is a Board member and major shareholder in the World Bank. We call on the UK to act in that role, and in its wider trade and development policies, to support a transformation of our food system to build long-term food security and reduce poverty. The UK government should:

- Use its influence and vote in the World Bank to end support for restrictive seeds laws and ensure a shift in World Bank investments to support an agroecological transition.
- Uphold its international obligations: As a signatory to the Seed Treaty (see Section 3.4), the UK should uphold farmers' rights and must not put conditions in trade agreements that push countries to sign up to restrictive seed laws such as UPOV91 (see Box 8, Section 2.2).
- Scale up investment in an agroecological transition: Shift public finance, including UK Aid, towards agroecological production approaches that start with farmer seed systems.



Photo by Olusoji Seye

Yarie harvests peppers grown on a farm run by and for local unemployed and underemployed young people who are using environmentally sustainable agricultural practices in Sierra Leone.

SECTION 1 Seeds are life



Summary

Seeds are central to food production and the types of seeds available to farmers shape how our food is produced, what is produced and who makes a profit from its production. This section explores how farmers need access to diverse seeds, and in particular to local varieties adapted to their needs and local contexts. But across Africa this access is under threat from the spread of an industrial model that seeks to increase the sales of agribusiness companies who sell hybrid seeds – and the chemical inputs such as fertilisers and pesticides needed to activate these types of seeds.

1.1 Seeds are at the heart of food production

Seeds are the starting point for most of the food we eat. Access to a wide diversity of seeds is vital for farmers to be able to grow the food we need and to provide nutritious diets for all. Diverse seeds are also a key tool for building climate resilience into our agriculture systems.

For thousands of years, this diversity has been developed by farmers growing crops and selecting seeds from the plants that grow best in their fields. They have used these saved seeds to breed new varieties, cultivating a vast diversity of cereals, pulses, vegetables and fruits. Each variety represents the innovation and choices of countless farmers as they have responded to the challenges of growing enough food for their communities, developing crops to resist local pests and diseases, and to flourish in their local climate and soils.

Historically, farmers bred their own crops, developing many local varieties adapted to their specific needs. But in the 1800s, farming and crop development began to be separate activities,⁶ initially in Europe and North America. Many farmers in Africa continue to develop their own varieties, but they also buy seeds produced by commercial plant breeders.

These commercial breeders provide registered varieties, often hybrid seeds, of a limited range of staple crops and vegetables. This route is called the commercial, or 'formal' seed sector.

Farmers can also acquire seeds from friends, neighbours, community seed banks and local markets. This route is known as the 'farmer seed system' or the 'informal' seed sector.⁷ Across Africa, the farmer seed system provides around 80 per cent of farmers' seeds.⁸ Women often play an important role in these systems, collecting and conserving traditional crop species and ensuring that crops planted contribute to a nutritious and diverse household diet. But the farmer seed system is under threat (see Section 1.2).



I cannot afford to purchase seeds for every planting season. With indigenous seeds I am sure I can get the seeds I need, when I need them. Why does the government want to oppress smallholder farmers by abolishing the use of indigenous seeds? Indigenous seeds represent our culture, our people's way of life, a rich tradition that has been handed down from generation to generation. The government should amend these punitive seed laws and allow us to freely share and sell indigenous seeds.⁹

Veronica Kiboino, a farmer from Baringo County, Kenya



Farmers need information about seed quality and characteristics to decide what to plant. In the farmer seed system, this is provided through local networks, social trust and farmer-to-farmer learning. In the commercial sector, certification, labelling and confidence in brand names provides the necessary information. Farmers like to choose seeds they can afford and that are easily and reliably accessible. For farmers in rural areas with poor transport links, commercial seeds are not easily available, and they can be prohibitively expensive. For these reasons, rural farmers often prefer farm-saved seeds or seeds they can access through the farmer seed system.¹⁰ For women, the farmer seed system is often the main source of the seeds they need. Social constraints and gender norms mean that women may not be able to participate in commercial activity, such as travelling to a market, and may not have access to cash to buy seeds from commercial sellers. They rely on seeds shared within the community.

Farmers also want seeds that they know will grow well and that are adapted to their farm conditions. Commercial seeds often only flourish in optimal conditions, on good land. This means that the farmer seed system particularly serves the needs of poorer farmers without access to inputs such as irrigation. For these farmers, planting a variety of crops reduces the risk of total harvest failure.¹¹

Box 2 Main types of seeds

Open-pollinated varieties (OPVs): These are seeds pollinated by natural means (e.g. by wind, insects, birds). They are often genetically diverse, making them more resilient and more able to adapt to changing environmental conditions. Farmers can usually save, share and grow these seeds freely. OPV seeds retain the characteristics of the parent plant in the next generation. Farmer varieties and traditional varieties are sometimes called 'landraces'.¹²

Hybrid seeds: These seeds are produced commercially through a process of cross-breeding. They are often called 'improved' varieties. However, they do not retain their qualities if saved by farmers for replanting. They often also need additional inputs – such as fertilisers, pesticides or irrigation – to produce high yields.

Genetically modified (GM) or genetically engineered (GE) seeds:¹³ Genetic modification changes the characteristics of plants at the molecular level by adding DNA from another plant or removing DNA sections. Through this process, scientists can create new varieties in a laboratory. Currently the vast majority of GM crops have been modified to be tolerant of specific herbicides and pesticides manufactured by the same companies that produce the seed.¹⁴

If one crop is resilient to drought and another can cope with high rainfall, then overall diversity increases a farmer's ability to cope with adverse weather conditions and build a more secure livelihood.¹⁵ This is absolutely vital as weather patterns become ever more unpredictable due to climate change.

Box 3 What is agroecology?

Agroecology is the application of ecological principles to agricultural production. Practitioners seek to create agricultural systems that resemble – and work in harmony with – natural systems. Agroecological practices aim to use, maintain and regenerate natural resources to build resilient, diverse and productive agroecosystems. Agroecology also aims to contribute to building socially equitable food systems. The 13 agroecological principles¹⁶ incorporate both environmental and social equity, putting farmers at the centre of decision-making and giving them control over their production.

Box 4 Agrobiodiversity for climate change resilience

In Bolivia, seeds have historically been the collective heritage of Indigenous communities, who have used and managed seeds to build biodiversity. Potatoes are a key staple crop, and Andean communities have domesticated hundreds of varieties, adapted to their unique ecological conditions and altitude.

CAFOD's partner – the Andean Communication and Development Centre (CENDA) – supports communities to maintain a high level of biodiversity, because they see its importance in ensuring that farmers can produce enough food for their families, and for nearby urban areas that depend on their production. They have seen that genetic variability between species and varieties is vital for crop resilience and adaptability to climate change. This is achieved through participatory research with farmers that supports them to regenerate native biodiversity to ensure food sovereignty and retain control over their seeds.

CENDA supports families to improve their food production and diversify their income sources, using ecological and sustainable methods. Revitalising and adopting cultural practices has played a critical part in this – many of these practices are key to combatting the effects of climate change, therefore making household crops and people's incomes more resilient.



Photo by Nikki Evans

Quechua and Mayan indigenous communities from Bolivia are working towards climate resilience. Casiana, Amalia and Victoria (L to R) visited a Mayan community in Guatemala to exchange cultural and agroecological experiences.

Through the farmer seed system, producers can access a wide diversity of seeds, which are an essential starting point for building a sustainable and resilient food system. But this diversity is at risk as the commercial seed sector expands. If seed diversity is lost, we will not have the tools to transform agricultural production from the current intensive model to a system that works with nature – a system known as ‘agroecology’ (see Box 3). Maintaining and expanding the farmer seed system is therefore vital for the future of the food system as a whole.

Agroecology prioritises using natural resources efficiently and reducing the use of external inputs like fertilisers and irrigation. It reduces costs by using biological methods of weed and pest control. It is therefore valuable for small-scale farmers with scarce resources. It is based on the recognition that agricultural production has many functions, beyond producing food, and that a crop can provide value beyond its yield. For instance, other parts of a crop may be used for fuel or animal fodder, reducing household expenses or providing additional income.

“*Agroecology helps boost the livelihoods of family farmers and decreases rural poverty by reducing farmers’ reliance on external inputs, subsidies and volatility of market prices. Agroecology can promote increased economic resilience, provide income stability over the year and connect consumers to producers, thereby improving bargaining power and reducing profit loss when public policy provides support and access to finance and secure markets.*”¹⁷

The United Nation’s Food and Agriculture Organization (FAO)

1.2 Farmers’ access to seed diversity is under threat

The way food is grown, and the range of crops farmers can grow, depends on what seeds are available to them. But the choice of seeds is decreasing, and global crop production is becoming more homogenised.¹⁸ Of the more than 6,000 edible plant species that we have cultivated over centuries, just nine crops now account for more than 65 per cent of all crop production.¹⁹

This loss of diversity is a crisis for the future of the food system. Genetic diversity means that crops can adapt to their environment, develop resistance to pests and diseases, and evolve in response to changing conditions, including those created by climate change. The Intergovernmental Panel on Climate Change (IPCC) has stated that access to diverse seeds is a key strategy to counter the risk of lower food production as climate change impacts become more severe.²⁰

Increased reliance on fewer crops can also affect nutrition. In African countries, as production of maize and other commodity crops has expanded, production of nutritious and climate-resilient crops like millet and sorghum has declined. Now, maize production dwarfs both, due to the many incentives to produce it, despite the nutritional value and demonstrated climate-resilience of these traditional crops.²¹

If farmers can only access seeds from the commercial sector, it locks them into a model of agricultural production that serves the global market, not their own communities. It reduces their choice about how to farm, what to grow and what inputs to use. Their ability to innovate and produce new varieties to respond to their local environment is also undermined.

Crop diversity is under threat from the expansion of an industrial model of agriculture that focuses resources on developing a small number of staple crops that can be traded around the world.

As a result of the spread of monocrops and an industrial agriculture model, there has been a shift from agriculture to agribusiness. This has changed the very essence of the relationship between farmers and seeds. As one study observed: “where genetic diversity and farmers’ knowledge was once the basis of farming, farmers are increasingly seen as customers, with corporate seed and chemicals replacing their own ingenuity”.²²

Farmers face barriers to accessing the wide variety of local seeds they used in the past. Instead of saving, producing and sharing seeds between neighbours and communities, they have to buy them from seed merchants.

Box 5 Understanding agribusiness

An agribusiness is a company that produces food, sells seeds and fertiliser, researches and breeds plant species and seeds, produces farm technology and equipment, transports food or sells food or ingredients. Sometimes a company is involved in multiple parts of a food supply chain or value chain. Agribusinesses are also involved in research and development, services and finance.

Although agribusinesses technically come in different sizes – from small and medium-sized businesses to large global conglomerates – the term does not usually refer to small, family-owned farms. When we refer to agribusiness, we are usually talking about some of the largest companies in the world, which operate on an industrial scale in multiple countries, such as Bayer, Corteva and ChemChina/Syngenta.

It is in the interests of commercial companies to sell high volumes of a small range of products, because that brings in the most profit. They therefore concentrate on producing seeds for crops with large markets – mainly staples such as maize, wheat, soy and rice.²³ Agrochemical corporations have little interest in crops that small-scale farmers want to grow, and for which there will never be a global market on the scale of crops such as maize. By definition, poor small-scale farmers are unable to create market demand.

This industrial agriculture model encourages the homogenisation of global diets because this maximises benefits for agribusiness.²⁴

- Grain traders can buy the same product from anywhere in the world.
- Multinational food processing companies can buy the same ingredients from the cheapest producer at any time of year.
- Large agrochemical corporations can sell their seeds, fertilisers and pesticides at scale across many countries.

1.3 Corporate concentration in the agricultural inputs sector

This is what makes the global seed industry a growth area. Giant multinational seed and agrochemical companies such as Bayer, Corteva and Syngenta are increasing their sales of hybrid and GM seeds around the world²⁶ and are doing their best to increase their presence across Africa.²⁷ We have therefore focused on countries in Africa in this report, because this is the region where the industrial agriculture model is least embedded, and where countries are facing the most pressure to adopt seed regulations that serve the interests of seed corporations.

Large agribusinesses have gained ownership of seed patents (see Section 2.2) by buying out smaller companies that own seed varieties with useful characteristics, called traits. For instance, between 1996 and 2013, the largest seed companies in the United States bought out almost 200 smaller companies.²⁸ This increased corporate concentration in the sector and reduced choice for farmers. As putting patents on seeds has expanded into other countries, global buy-outs and mergers have taken place, with global agribusinesses gaining ownership of seed companies in multiple countries.

These markets are already highly concentrated, with Bayer, Corteva, BASF and ChemChina/Syngenta controlling more than 50 per cent of the global commercial seed market.²⁹ These same four companies also control more than 60 per cent of global agrochemical sales (see Figure 1). As a World Bank report from 2008 notes, economists generally consider a market is no longer competitive when only four firms control more than 40 per cent.³⁰ Corporate concentration and the lack of a competitive market, enables companies to increase prices.³¹

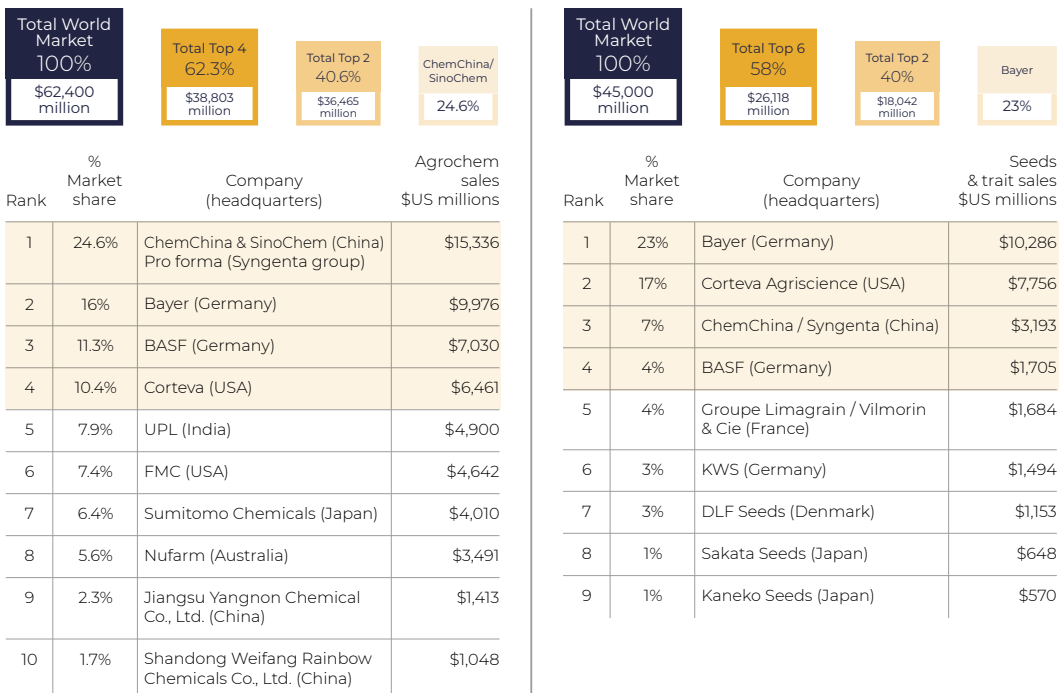


Biodiversity is critical for safeguarding global food security, underpinning healthy and nutritious diets, improving rural livelihoods, and enhancing the resilience of people and communities

FAO's Director-General
José Graziano da Silva, 2019²⁵



Figure 1: Agrochemicals & commercial seeds



Leading companies by Agrochemical sales, 2020

Leading companies by seeds and traits sales, 2020

Source: Food Barons – ETC Group, 2022³²

The growing market power of large firms can limit farmers' choices.³³ For instance, companies provide incentives to agro-dealers to stock their products exclusively. This reduces the availability of seeds produced by other companies and locks farmers into having to buy from the big corporations. It also reduces farmers' choices about how to farm. For instance, research in the United States shows that more than 90 per cent of corn seeds are treated with pesticide coatings,³⁴ leaving farmers with little choice but to use these treated seeds.³⁵ This makes it much harder for farmers to use agroecological or organic farming methods.

Corporate concentration has not happened by chance. As sales of fertilisers, herbicides and pesticides have decreased or stagnated in the global North, agrochemical companies have looked for new markets and new sources of revenue.³⁶ They have bought seed companies and taken out patents for genetic modifications that make seeds resistant to pesticides and herbicides. They are then able to insert the resistant genes into many different crops and increase sales of their chemical products.³⁷

Experience from countries where seed patenting is extensive indicates that patents significantly increase the costs of seeds. In the United States, prices of soybean seeds rose by over 300 per cent from 1995-2011 after the introduction of patented GM soy.³⁸

In summary, corporate concentration and control of the seed sector does not serve the needs and interests of smallholder farmers. Loss of crop diversity does not build a resilient and sustainable global food system.

It is vital, therefore, to support farmer seed systems to make sure farmers can access a wide range of local varieties. When investment and policy decisions are designed to support the commercial market for a few key crops, they do not support the farmer seed system, and threaten to undermine food systems that generations of people have relied on to feed their families sustainably.

“
This high concentration of corporate power allows a relatively small group to restrict people's access to seeds, and to shape markets and innovation in a way that serves the ultimate goal of shareholder profit maximization and not the public good.
”
 Report by Michael Fakhri, Special Rapporteur on the right to food, 2022³⁹

SECTION 2 The World Bank's role in promoting industrial agriculture



Summary

The World Bank is promoting the industrial agriculture model in Africa. We analysed World Bank materials, including policies, project documents and data sets, to find out what conditions the Bank has placed on its loans, over several decades and multiple countries. We examined academic studies and other reports to understand the impacts of these conditions. We focused on countries in Africa because this is the region where the industrial agriculture model is least embedded and where the greatest expansion is happening. We found that, through conditions on its financing over the last 15 years, the Bank has pushed African countries to implement seed laws and subsidies so that farmers have greater access to hybrid seeds and chemical inputs. The Bank argues that, to increase productivity, farmers need access to these inputs, and in order to achieve greater access, it is essential to support agribusinesses to expand their markets. As we will see in this section, the World Bank measures the success of its interventions on the increased participation of the private sector in markets and whether sales of hybrid seeds and chemical inputs have increased, instead of prioritising measuring whether its approach reduces poverty or increases food security.

The World Bank's approach in Africa is underpinned by arguments presented in its 2008 World Development Report, *Agriculture for Development*.⁴⁰ The authors make the case that increasing agricultural productivity is essential to reducing poverty. The report discusses various ways to make this happen, including public investment, increasing market access and availability of finance. In relation to input markets, the report argues that "especially for seed and fertilizer, market failures continue to be pervasive in Sub-Saharan Africa because of high transaction costs, risks, and economies of scale. As a result, low fertilizer use is one of the major constraints on increasing agricultural productivity in Sub-Saharan Africa."⁴¹

In the Bank's worldview, the way to ensure access to 'improved' certified seeds and chemical inputs is to increase private sector production and distribution of these inputs. We will show that it has done this in two key ways over the last 15 years: by pushing countries in Africa to implement subsidies and to pass new seed laws.

The World Bank measures the success of its interventions on the increased participation of the private sector in markets and whether sales of hybrid seeds and chemical inputs have increased, instead of prioritising measuring whether its approach reduces poverty or increases food security.

Box 6 How the World Bank puts conditions on its lending

In 2004, following criticism from the development community and an internal review of the World Bank's policy in instituting conditionalities,⁴² the Bank devised Development Policy Financing (DPF) to replace its now defunct Structural Adjustment Programmes (SAPs) and Sectoral Adjustment Loans (SECALs).

Development Policy Financing is a lending instrument of the World Bank that is disbursed as general budget support. This means it is provided in the form of non-earmarked loans, grants, credits or policy-based guarantees. This finance is provided by the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA), which are both part of the World Bank Group. IBRD's clientele consists largely of middle-income countries, while IDA provides concessional loans and grants to low-income and lower middle-income countries.

When establishing a programme, the Bank determines a set of policy and institutional actions that the recipient country must undertake to make the programme successful. These actions are translated in the programme document into 'prior actions'. These prior actions are a set of policy and institutional actions – framed in legal terms – that a country has to comply with before the Bank's Board approves the programme. For example, a loan to the government of Malawi came with the prior action that its Ministry of Finance (MoF) should agree to increase subsidies.⁴³

2.1 Distorting markets with subsidies

Over the years, the World Bank has changed its mind several times about the economic efficiency of agricultural subsidies⁴⁴ but ultimately it has backed numerous seed and fertiliser subsidies through its financing.⁴⁵ This has meant government support has lowered the cost of these inputs for farmers. According to a former senior agricultural economist who worked at the Bank, part of the logic was that it could shape the design of these programmes, particularly in Africa, if it financed them.⁴⁶ The Bank placed conditions on its financing to implement e-voucher subsidy schemes for hybrid seeds and/or chemical fertilisers in Mali in 2017,⁴⁷ 2019⁴⁸ and 2020,⁴⁹ Niger in 2018,⁵⁰ Kenya in 2019⁵¹ and Guinea in 2020.⁵²

In its *Agriculture for Development* report, Bank staff argued that “through the judicious use of subsidies, it is possible to underwrite risks of early adoption of new technologies and achieve economies of scale in markets to reduce input prices”. They also wrote that “approaches to jump-starting agricultural input markets include targeted vouchers to enable farmers to purchase inputs and stimulate demand in private markets, and matching grants to underwrite selected start-up costs of entry of private distributors to input markets”.⁵³ The authors emphasise the need to stimulate demand and believe that, to do this, it is worth underwriting the “risks of early adoption of new technologies”.

In Section 3, we will explore the fact that this package is unaffordable for farmers, especially for many of the poor farmers that CAFOD supports through our network of partner organisations across Africa.

Another issue is whether the subsidy programme is affordable to national governments in the long term. As the authors of the *Agriculture for Development* report acknowledge, “Like any subsidies, input subsidies must be used with caution because they have high opportunity costs for productive public goods and social expenditures and they risk political capture and irreversibility”.⁵⁴ This raises difficult questions around whether countries in the global South should use precious funds so that farmers can afford hybrid seeds and chemical inputs if that means there are fewer funds to finance healthcare, education or any other national priority. And even more so if poor smallholder farmers cannot afford these inputs in the long term.

In practice, these subsidies have put significant pressure on national budgets. Several African countries have spent hundreds of millions of dollars a year.⁵⁵ At some points, this has taken up 50 per cent of agricultural budgets in Malawi, Zambia and Ethiopia.⁵⁶ In a 2014 report, the Bank noted that “the benefits tend to wear off over time, and the costs are high and can divert public funds from investments that provide better returns over a longer period of time. Once started it is very challenging for governments to discontinue subsidies.”⁵⁷

Box 7 World Bank changes its mind on subsidies

Between 2008 and 2013, the World Bank repeatedly placed conditions on its finance to Malawi, requiring the country to expand its farm subsidy programme. But in 2017 the Bank changed its mind. It provided a new loan with conditions to reform the subsidy programme by reducing the number of farmers who could access it.⁵⁸ However, this was a lot harder to do in practice. The Bank evaluated the 2017 loan in 2021. It found that the Malawi government did not completely fulfil the conditions because inputs were still being made available to “all smallholder farmers” through a new subsidy programme called the Affordable Inputs Programme.⁵⁹

The Bank noted that the “there is a real question of the fiscal impact and hence the affordability” of the Affordable Inputs Programme based on the fact that the previous subsidy programme had taken up 11.5 per cent of budget funds. The difficulty in reducing the size of the subsidy programme confirms the warning in the 2014 World Bank document mentioned above that predicted, “Once started it is very challenging for governments to discontinue subsidies”.⁶⁰

As we discuss in Section 3, the Bank has recognised that seeds and fertiliser produced by agribusiness are unaffordable for smallholder farmers. However, instead of supporting farmers to grow food without relying on expensive inputs, it has required governments to use money to subsidise industrialised seeds and chemical inputs, resulting in increased sales and control over the food systems by large agribusiness companies. Although these subsidies have sometimes led to increased yields, our research shows how this has been undermined by other factors such as their affordability and the way they lock farmers into buying seeds and fertilisers each year.

This is very clear from the conditions placed on World Bank financing:

- In Malawi, a 2008 World Bank loan required the government to implement a “targeted fertiliser and seed subsidy program with 28 per cent private sector participation in fertiliser distribution”,⁶¹ while the 2017 World Bank loan was evaluated on “the share of fertiliser input subsidy programme directly retailed by the private sector”.⁶²
- A loan to Burkina Faso in 2012 required increased involvement of the private sector in fertiliser distribution: “Continued involvement of the private sector in the fertilizer distribution process, by the issuance of invitations to private suppliers to bid on at least 6,900 metric tons of fertilizer to be purchased by the Recipient for distribution to rice and maize producers.”⁶³
- According to the Oakland Institute, the main beneficiaries of a 2019 loan to Kenya that promoted an e-voucher fertiliser subsidy programme are likely to have been fertiliser company Yara East Africa and seed companies such as Syngenta and Bayer.⁶⁴

Fertilisers are often heavily subsidised, effectively transferring public funds to agribusiness companies. When they take advantage of such subsidies, it further entrenches their power.⁶⁵ *The Economist* reported in 2018 that most of the public spending on agriculture in Malawi was “swallowed up in a costly system of seed and fertiliser subsidies” that had increased yields whilst lining the “pockets of the well-connected businessmen who win procurement contracts”.⁶⁶ While subsidies can benefit agribusinesses, these benefits often do not reach the poorest. One academic review of 80 studies concluded that households with more land received more inputs. It also found mixed results in terms of whether subsidies increased farmers’ incomes.⁶⁷



Photo by Ced Naughton

Adama Salliah co-ordinates a community agriculture 'pepper' group in Sierra Leone, part of a programme that helps farmers build resilient livelihoods and improve their food security. The group was set up with support from CAFOD's partner, the Handmaid Sisters.

This has meant that farmers with land in ecological regions where crops grow easily (called high potential areas) often benefit more from using high-cost inputs than farmers growing crops on poorer quality land. The inputs generally also benefit farmers with greater access to other resources and infrastructure, such as transport and financial services. This means that women are often at a disadvantage: they are less likely to own land and are less able to access credit. For instance, the World Bank reported that 86 per cent of targeted farmers adopted new technology (i.e. seeds and fertiliser packages), as a result of its financing in Nigeria. However, while 91 per cent of male farmers started using these inputs, only 41 per cent of women farmers did.⁶⁸ This contradicts goals to empower women.⁶⁹ Nonetheless, the World Bank's evaluation of its programme in Nigeria claimed that it had "addressed constraints on women farmers' access to seeds, fertilizers, and extension services."⁷⁰ However, this is not borne out by the figures.

The World Bank has recognised the important role that women play in the agriculture sector.⁷¹ They recognise that women often face barriers that mean their yields are lower than those of male farmers. But subsidy programmes have not been designed to target women. For instance, Zambia's subsidy programme led to small yield increases for both male and female farmers, but the yield increases were larger for male farmers. This means that the subsidy programme increased the productivity gap between men and women. Research indicates that this is because the subsidy programme only focused on one aspect affecting productivity. The other barriers women faced, such as access to land and credit, remained.⁷²

2.2 Forcing countries to implement seed laws

Since the publication of *Agriculture for Development* in 2008, another favoured way of increasing access to hybrid seeds in Africa has been for the Bank to place conditions on its financing that require the implementation of seed regulations. The Bank has done this in the Central African Republic, Chad, Ghana, Sierra Leone, Liberia, Mozambique and Nigeria (see Table 1).

These laws are often similar to each other in structure and content, covering areas such as: which seeds can be certified, patents on seeds, how certification takes place, and what authorities should be set up to oversee these processes. The laws usually also state that seeds can only be sold if they are certified and listed in the national catalogue.



Photo by Tendai Muchada

Fiona grows vegetables in the nutrition garden of Mtora Hospital shelter in Zimbabwe. The shelter provides a safe place close to the hospital for pregnant women nearing their due date.

Box 8 Types of seed regulations

A range of laws and regulations can apply to seed varieties produced in the commercial sector. These are usually enacted at the national level. Sometimes they have an international dimension, as is the case with the International Union for the Protection of New Varieties of Plants (UPOV) Convention discussed below.

Plant breeders' rights (PBR): Also known as plant variety protection rules, these are a form of intellectual property protection for plant varieties, defined under the UPOV Convention (see below). To be protected, varieties must pass tests to show they are "new, distinct, uniform and stable".⁷³ They protect the commercial rights of plant breeders over seeds that have been registered as a new variety. Other breeders are not allowed to sell the variety, but PBRs often include an exemption allowing the variety to be used to produce further new varieties, or for research.⁷⁴ They sometimes also contain an exemption to allow farmers to save and replant varieties, but not to share or sell them. It is important to stress that plant variety protection rules must protect plant breeders' rights, but it is optional whether they also protect farmers' rights.

Patents: A more stringent form of intellectual property protection that rarely include any exemptions. This means that permission of the patent holder must be sought to use a variety for research or further breeding. Patents can also apply to the technology used to create a new variety, and all genetic material of the plant, meaning that genetically modified crops often have additional patent protections on them. Because of these rules, seeds created in this way can only reach farmers through formal markets and seed producers have full control over pricing, distribution and marketing. Apart from these practical considerations, there is an ethical question about whether any commercial actor should be able to claim plant genetic resources as private property.

Seed marketing and trade laws: Many countries only allow registered seeds to be marketed. These registered seeds are listed in catalogues. Across Africa, there are also regional trading blocs that apply controls over which seeds can be traded across borders.

Seed catalogues: If a crop breeder wants to sell their seeds on the commercial market, they have to register them for inclusion in a catalogue of approved (or certified) seeds. But it is extremely difficult for farmers to get their seeds registered and included in the catalogues (see Section 3.4). This means that the process once again gives an unfair advantage to seed companies. The purpose of certification is to give growers information about the type and quality of seeds they are buying, and to increase the availability on the market of high-quality seeds that are expected to increase productivity. But the effect of introducing official lists (the seed catalogues) is to limit which seeds can be bought and sold.

UPOV (International Union for the Protection of New Varieties of Plants), 1961, revised 1978 and 1991

UPOV was established by a handful of European countries in 1961, with the mission to "...provide and promote an effective system of plant variety protection".⁷⁵ Its purpose is to protect the inventions of commercial plant breeders, establishing intellectual property rights for plant breeders, called plant breeders' rights (PBR). This protection is intended to encourage breeders to develop new varieties. Plant varieties that can be protected under UPOV must be: "(i) new, (ii) distinct, (iii) uniform, (iv) stable..."⁷⁶ The convention allows some exceptions to PBR. Protected varieties can be used "...privately and for non-commercial purposes"; for research; and to breed other varieties.⁷⁷ There is an additional optional exception, which permits "...farmers to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety..." (Article 15, UPOV, 1991). The UPOV Convention was revised in 1978 and again in 1991. The 1991 revisions placed additional restrictions on farmers' rights. A few countries have signed up to UPOV78, giving them freedom to develop seed laws that support farmers' rights, but it is no longer an option: any country joining UPOV since 1998 has to sign up to UPOV91.

The explicit aim of seed laws is to open up African agricultural input markets to private investment. To incentivise companies to invest, the laws support the expansion of the commercial sector. This is deliberate and systematic as we show in Table 1. Companies are seeing their markets stagnate in countries where agricultural production is already highly industrialised.⁷⁸ To increase their profits, they need new customers. Africa is the final frontier for commercial expansion by the agrochemical companies that already dominate our global food system.⁷⁹

As we show in Section 3, the laws tend to support the expansion of the commercial seed sector, undermining the farmer seed system and facilitating corporate concentration. This increases dependency at multiple levels, reducing resilience and increasing vulnerability.

Table 1: Table of seed laws

We have highlighted in **green** the part of the Bank's conditions that specifically state the country's law should increase the role of the private sector.

Year	Project ID	Project Name	Country	World Bank conditions on financing text taken directly from World Bank database
2011	P122796	Third Agriculture DPO	Ghana	The Recipient has: ii. enacted the Plants and Fertilizer Act.
2012	P122808	Fourth Agriculture DPL	Ghana	The Recipient has, through the Office of the President, constituted, and, through the Ministry of Food and Agriculture, adequately funded the National Seed Council, the National Fertilizer Council and the Plant Protection Advisory Council, in accordance with the sixteenth paragraph of the Letter of Development Policy.
2013	P129489	First Agriculture DPO (AGDPO-1)	Mozambique	The Recipient has ratified the SADC-compliant national seed regulations (the Seed Regulations) governing production, trade, quality control and certification as evidenced by the letter issued by the Minister of Planning and Development on 19 February 2013, certifying that the Council of Ministers has ratified the Seed Regulations on 19 February 2013.
2013	P130012	First Agriculture Sector DPO	Nigeria	Approval of a new seed policy, reflecting the role of private sector in technology development, seed multiplication and marketing, and reflecting the regulatory role of the public sector.
2015	P146930	MZ Agriculture DPO-2	Mozambique	The Recipient's Council of Ministers has approved regulations for the protection of plant varieties that recognize the Southern Africa Development Community (SADC) seed harmonization protocol as evidenced by Decree Nr. 26/2014 published in the Recipient's Boletim da Republica Nr. 43 dated 28 May 2014.
2017	P156651	Productivity and Transparency Support Credit	Sierra Leone	Prior action #1: The Recipient has introduced legislation to regulate and promote foundation seed production, multiplication and distribution by the private sector , and, to such end, the Minister of Agriculture has duly submitted the Bill entitled <i>The Sierra Leone Seed Certification Act of 2017</i> to Parliament for its approval.
2017	P160123	State Consolidation Development Program	Central African Republic	The Recipient has adopted two instruments to operationalize the 2015 Seeds Law, namely: (i) a Décret 16.351, dated 19 October 2016, approving the statutes of the National Seeds Office (NSO); and (ii) an Arrêté interministeriel 091/2016, dated 20 October 2016, an Interministerial decision creating the body of seeds inspectors and controllers of the NSO.
2019	P163424	Chad First Programmatic Economic Recovery and Resilience Grant	Chad	The Ministry of Agriculture has implemented a Seed Law through: (i) the adoption and publication of the inter-ministerial Arrêté on seed production, control and certification regulations, (ii) the adoption and publication of an Arrêté on specific technical regulations for seed production of specific varieties of vegetables and cereals and (iii) the issuance of an Arrêté setting up the implementation of the seed control and certification function within the MOA.
2019	P168259	Sierra Leone - Second Productivity and Transparency Support Grant	Sierra Leone	The Recipient's Parliament has passed the Seed Certification Agency Act, 2017 which inter alia provides for a sustainable seed delivery system and private sector participation in seeds production and marketing.
2020	P168606	Second Programmatic Economic Recovery and Resilience Grant	Chad	To improve efficiency of agricultural inputs, the MOA has: (a) published the pricing system for seed certification through Arrêté 32/PR/MPIEA/DGM/DSCP/2019, and (b) registered the National Federation of Seed Producers in the Official Gazette of September 2018.
2020	P168218	Liberia First Inclusive Growth Development Policy Operation	Liberia	The Recipient has enacted the Liberia Seed Development and Certification Agency Act to establish a Seed Development and Certification Agency (SDCA) to, inter alia, provide for sustainable seeds delivery system and private sector participation in seeds production and marketing.

Source: World Bank Development Policy Financing⁸⁰

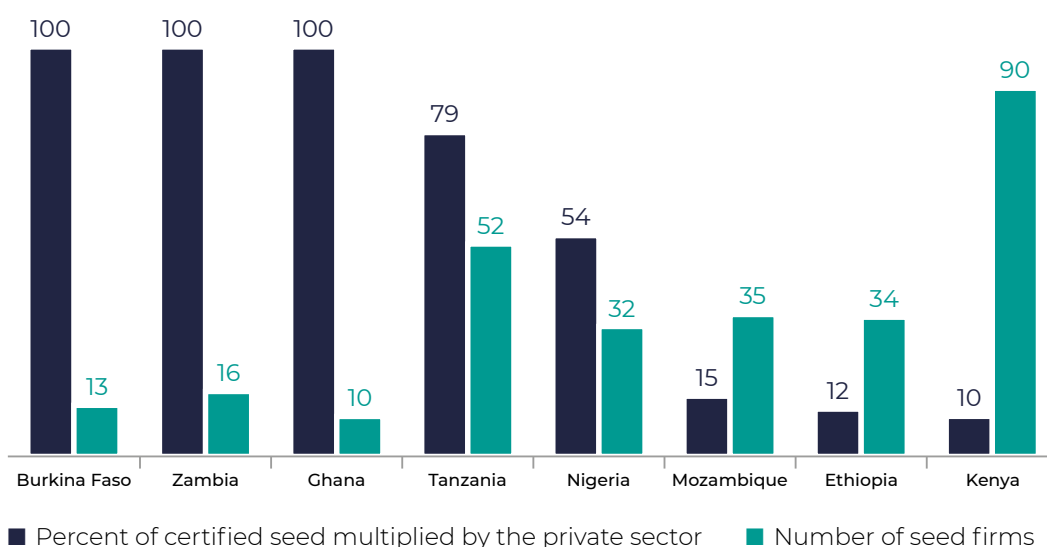
These laws and policies have the explicit goal of improving the enabling environment for private sector investors. This is based on the logic that, if companies are incentivised to develop, produce and distribute their hybrid seeds, then this will increase access to those seeds for farmers. For the Bank, there is complete alignment between its goal of increasing access and opening up markets for the private sector, which is why it chooses to measure its progress in this area. However, as we argue in this report, this is a flawed approach.

The World Bank has pushed for the spread of these seed laws that favour commercial hybrid seeds despite the fact that it has known for decades that commercial seeds do not meet the needs of all farmers. In a 1992 discussion paper, Bank staff reported that “in addition to lower production costs, other (potential) benefits from farmer seed retention include: zero transaction costs, high reliability of seed supplies, and consistent or predictable seed performance”.⁸¹

2.3 Using flawed metrics

The Bank takes the view that agricultural production will increase if farmers’ access to hybrid seeds and chemical inputs increases, and the best people to make that happen are private companies. This starting point leads it to flawed metrics for success. Instead of designing and evaluating its financing on whether it reduces poverty and food insecurity, it prefers to measure whether there is increased private sector activity in agricultural inputs markets. In other words, it measures increases in sales of industrial seeds and chemical inputs.

Figure 2: Number of seed companies and per cent of certified seeds supplied by private sector



Source: Agribusiness Indicators: synthesis report - World Bank, 2014.⁸²

This approach leads the Bank to look at metrics such as whether it is public or private companies selling certified seeds. For example, in a 2014 report on agribusiness indicators, the Bank regarded it as progress that in Burkina Faso, Zambia and Ghana, 100 per cent of certified seed is supplied by the private sector (see Figure 2).⁸³ However, if progress is measured based on tackling hunger or increased food security, the statistics tell a different story. FAO data show that the number of moderately or severely food insecure people in each country rose over the last decade (using a three-year average). In Burkina Faso, numbers of food insecure people rose from 7.6 million (2014-16) to 9.7 million (2018-20). Over the same time period, numbers rose in Zambia from 8.1 million to 10.8 million, in Ghana from 10.7 million to 11.6 million, and in Nigeria from 62.8 million to 120.5 million.⁸⁴

This example illustrates the potential disconnect between the World Bank's assumption that increasing access to agribusiness seeds and fertiliser, provided by the private sector, will lead to greater food security, and widespread benefits for smallholder farmers. While correlation is not necessarily causation, it is worrying that the World Bank cannot evidence the impact of its financing in addressing food insecurity. The Bank's Independent Evaluation Group uses these same flawed metrics to assess the Bank's performance. For example, when evaluating the impact of their financing to Nigeria (2013-15), the IEG focused on whether the prior actions had been implemented, measuring outcomes such as the development of "profitable seed and fertilizer supply chains" and the increased use of hybrid seeds and fertilisers. It relegated factors such as gender, poverty alleviation and climate impacts to a section at the end of the report headed 'Other issues', which include 'Environmental and Social Effects'.⁸⁵

Instead, the IEG should be asking how the Bank is meeting diverse farmers' needs, and if its interventions are helping the poorest farmers and reducing hunger and poverty.

The World Bank's priorities to increase sales for agribusiness whilst deprioritising the needs of poor smallholder farmers are illustrated by the fact that its financing does not always target the poorest.

In Malawi, the 2017 loan specifically requested the government "shift from targeting the extremely poor to targeting more productive farmers who were better positioned to make use of seed and fertilizer subsidies".⁸⁶ Meanwhile, the World Bank's own evaluations show that it is not even asking the right questions about impacts on poverty. In Mali, a Bank evaluation on a 2017 loan observed: "data on use of e-vouchers for fertilizers and extension services by beneficiaries belonging to poorer households (or communities) would have contributed to an understanding of the project's efficacy". It went on to say, "underlying M&E [monitoring and evaluation] data do not contain information related to poverty impact and RIs [results indicators] generally did not incorporate pro-poor dimensions".⁸⁷

The World Bank's pro-agribusiness approach and lack of attention to whether this approach actually reduces poverty in practice was encapsulated in its Enabling the Business of Agriculture (EBA) rankings. These rankings ran between 2013-21 (and may be included as part of reformulated Doing Business rankings).⁸⁸ They were used to encourage countries in the global South to promote a pro-agribusiness policy environment. In the Bank's own words, the EBA "enables policymakers to identify and analyze legal barriers for the business of agriculture and to quantify transaction costs of dealing with government regulations".⁸⁹

When it was operational, the EBA benchmarked and scored countries on how they facilitated business opportunities in agriculture in areas such as markets, finance, transport, machinery, seeds and fertiliser. Certain 'good practices' were used to give higher scores or reduce points if they were not in place. These included: regulating seed systems so that private companies were increasingly involved in the production and marketing of seeds; increasing private sector representation in committees deciding which seed varieties could be sold; improving, accelerating and minimising the costs of procedures to release and certify industrial seeds; and incentivising private seed production by adopting intellectual property rights (IPR) frameworks.⁹⁰

Donors to the EBA included the UK, US and Dutch governments and the Bill and Melinda Gates Foundation. The Oakland Institute argues that the Bank made insufficient efforts to consult with farmers but did listen to the views of Bayer, Monsanto, Syngenta, Pioneer, Yara and other agribusinesses when setting up the EBA.⁹¹

There is a potential disconnect between the World Bank's assumption that increasing access to agribusiness seeds and fertiliser, provided by the private sector, will lead to greater food security, and widespread benefits for smallholder farmers.

Box 9 World Bank takes the same discredited approach as the Alliance for a Green Revolution in Africa (AGRA)

AGRA was launched in 2006 and works across 11 countries in sub-Saharan Africa. AGRA's approach is very similar to that of the World Bank. Similar concerns have been raised in evaluations of AGRA's goals and outcomes. For example, AGRA commissioned an evaluation⁹² on its activities that showed the Alliance has succeeded in shaping the policy environment in the countries in which it operates and has opened up markets in African countries to multinational companies, increased fertiliser sales for those companies, and increased sales of hybrid seeds. But the evaluation also showed that its approach has not had the hoped-for impact on food security and farmer incomes.

The academic Timothy Wise carried out his own evaluation of AGRA in 2020.⁹³ He found that, from 2004-18, maize yields did increase in Ethiopia, Rwanda, Uganda and Mali. However, in Kenya, Nigeria, Tanzania and Zambia, there was lower than expected yield growth despite subsidy programmes and other support. Cassava, a key staple in Nigeria, Mozambique, Uganda, Tanzania and many other AGRA countries, saw a 6 per cent decline in yields. Overall, roots and tubers, which include nutritious traditional crops such as sweet potatoes, experienced a 7 per cent decline in yields. Groundnuts, another critical staple source of protein in many countries, saw an alarming 23 per cent drop in yields.

Even when yields did increase, this did not necessarily always help increase farmers' incomes as input costs increased. As Wise noted: "in Malawi seeds and fertilizers cost three times the value farmers could gain from the small maize yield increase assuming the farmer can afford to sell all of the added production. Many can't; their families need to eat."⁹⁴ This suggests a fundamental flaw in their approach: liberalising seed and fertiliser markets does not seem to guarantee a positive impact on food security, poverty or livelihood resilience.

The independent evaluation of AGRA found that, "Farmers who adopted improved inputs and experienced yield increases were typically younger, male, and relatively wealthier.... productivity and income gains were also concentrated among these relatively high-resource farmers."⁹⁵

The main area where AGRA's approach has been successful is in engaging private sector actors – and in doubling fertiliser consumption in some of the countries it has operated in. The evaluation goes on to highlight the failure of the approach to take into account constraints affecting farmers, such as lack of access to irrigation and markets. It also did not take account of the negative environmental impacts of the approach; or to consider the risks facing farmers because of climate and market volatility. Their 'one size fits all' approach was not aligned with the realities of farmers' daily lives.

Overall, these evaluations have shown that "there is little evidence that this 15-year investment in promoting market-driven development based on expanded use of commercial seeds and fertilizers has improved farmers yields, incomes or food security".⁹⁶ These failings have led over 200 civil society organisations to demand that donors, including the UK government,⁹⁷ end their support for AGRA.⁹⁸

2.4 A cheerleader for hybrid seeds and chemical inputs

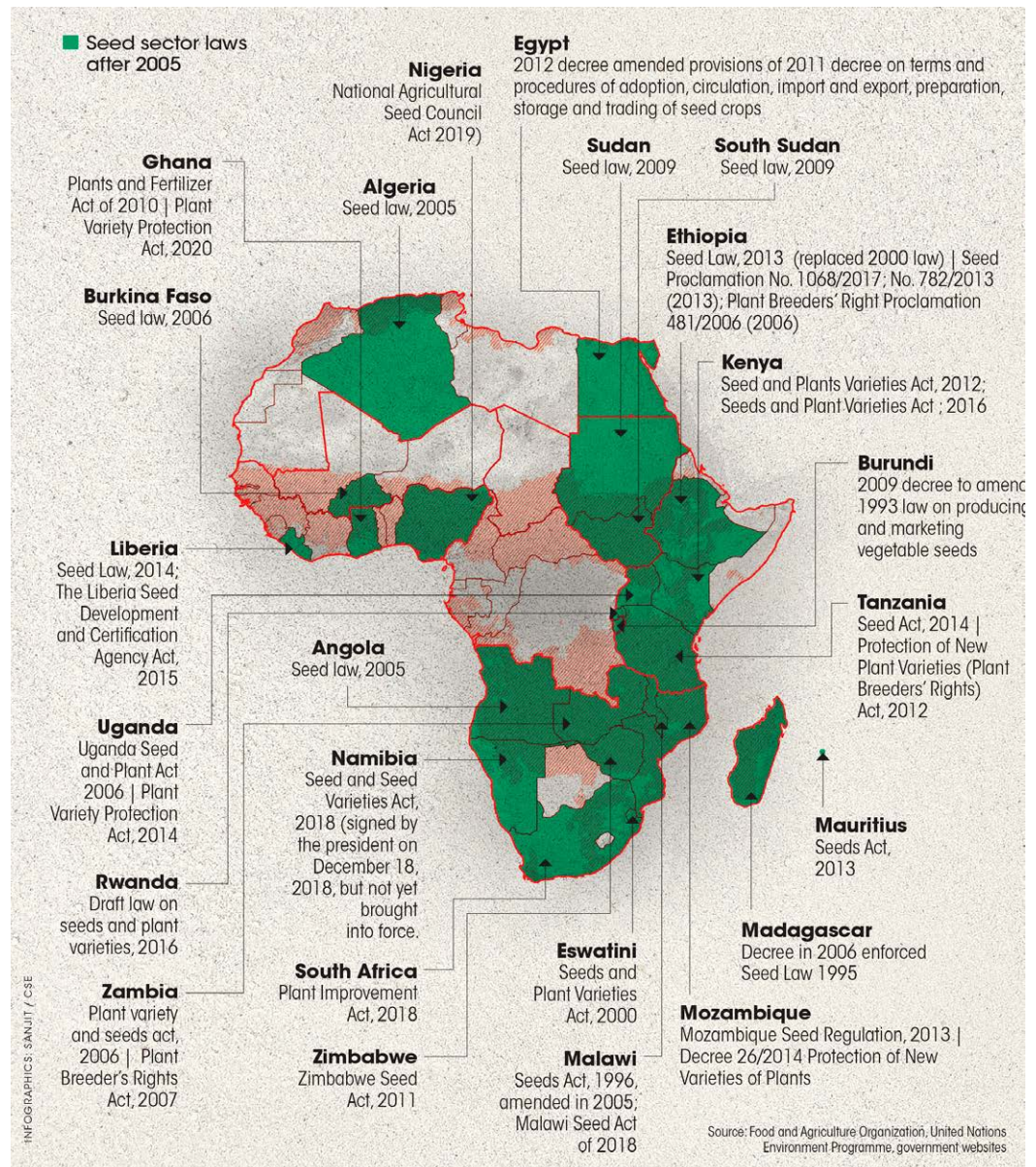
Through its conditions on financing, the Bank plays an instrumental role in creating a policy environment that supports the expansion of industrial agriculture. This aligns with the objectives of multinational agribusiness corporations that directly benefit from increased sales if more farmers adopt their seeds and chemical inputs.

Agribusiness companies use their lobby groups to target governments. They need governments in the global North to promote their agenda at the World Trade Organization and to include clauses in trade deals that are favourable to the certified hybrid seed agenda, such as requirements to align with international agreements that protect the property rights of plant breeders (such as UPOV91 – see Box 8 in Section 2.2). They need governments in the global South to harmonise their trade policies and seed laws to allow the influx of agribusiness seeds and fertilisers. They also rely on southern governments to subsidise hybrid seeds and chemical inputs so more farmers can afford to purchase them.

Other key actors that are pushing this agenda are philanthropic organisations. The Bill and Melinda Gates Foundation funds various initiatives including AGRA (see Box 9 in Section 2.3), which finances and lobbies governments in the global South to increase the adoption of industrial seeds and chemical inputs. One of AGRA's activities has been to support or set up national seed trade associations to lobby for seed laws. For example, AGRA worked with the African Seed Trade Association (AFSTA), which received finance from the Gates Foundation, US Department of Agriculture (USDA), and the Ministry of Agriculture and Irrigation of Malawi.⁹⁹ More recently, AGRA helped to establish the Seed Traders Association of South Sudan, which a Dutch government-funded evaluation noted was “in a unique position to lobby the government regarding seed policy and regulations”.¹⁰⁰

The combined push for seed regulations by the World Bank, agribusiness lobby groups and entities such as AGRA has contributed to a wave of legislation across Africa since 2006.¹⁰¹

Figure 3: Seed sector laws after 2005



Source: Down to Earth, 2022¹⁰²

SECTION 3 The World Bank is failing poor smallholder farmers in Africa



Summary

The World Bank has a mandate to reduce poverty. Therefore, it should be listening to, working with, and meeting the needs of the poorest farmers. Smallholder farmers need to be able to grow food in ways that work for them in their local context in the short-, medium- and long-term. This means going beyond a short-term focus on increasing yields to a more comprehensive approach that strengthens their overall resilience to shocks, whether they are economic (fluctuating prices) or environmental (biodiversity loss and extreme weather events). Access to diverse seeds is a crucial component when it comes to achieving this.

In this section, we show how the World Bank's approach has not always met the needs of poor smallholder farmers. This is because, while hybrid seeds and chemical inputs can increase yields, they are often not affordable. They can also pollute soils and water sources; and seed laws can reduce access to diverse seeds.

3.1 Hybrid seeds and chemical inputs are unaffordable for many

There is substantial evidence from multiple African countries showing that, when smallholder farmers use 'improved' seeds and chemical inputs, their yields can increase.¹⁰³ However, this is not always the case, as has been shown in the sporadic success of AGRA to increase yields (see Box 9 in Section 2.3).

While yields could increase, many poorer smallholder farmers know or fear this approach will be too expensive. Study after study, across different countries, highlights that the costs of shifting to farming methods based on using industrial seeds and chemical inputs are beyond the reach of many poor smallholder farmers.¹⁰⁴ Some estimate that "certified seeds are sold at prices 1.5 to 2 times the price of grain" in countries in the global South.¹⁰⁵ In countries such as Zimbabwe, Malawi and Kenya, the higher cost of hybrid maize seed varieties has been a barrier to adoption.¹⁰⁶

The World Bank knows these inputs are unaffordable for poor farmers and the economic risks they take if they adopt them. A 2013 World Bank discussion paper on the seed trade in Africa stated: "hybrid seeds are usually more expensive than other types of seed. Farmers in a low potential environment, and/or who cannot afford or count on local shops to stock inputs such as fertiliser needed for a high yield, might not recover the extra cost of investing in a hybrid."¹⁰⁷

Even the Bill and Melinda Gates Foundation-backed AGRA initiative acknowledges this is the case. In 2022, AGRA's management recognised that it was important to "understand the complex issues that farmers face in the farming landscape" and that one area under consideration was "farmers' binding constraints, such as the ability to afford both seeds and fertilizers. Some farmers cannot buy inputs at all due to a lack of financing".¹⁰⁸ This can become even more difficult when the prices of inputs such as fertilisers can fluctuate wildly.

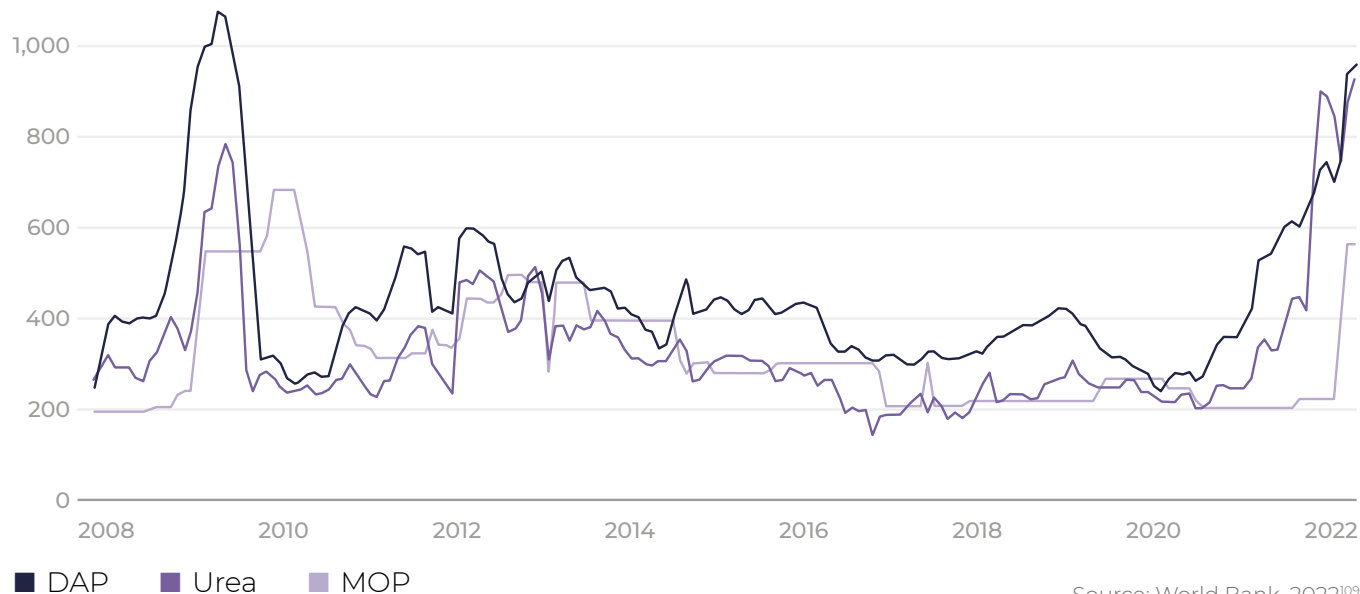


Photo by Caritas Gokwe

In northern Zimbabwe, Marian waters her vegetable plot. She receives support from CAFOD's local partner Caritas Gokwe

Box 10 Fertilisers can be too expensive, damage soils and contribute to climate change

Figure 4: Fertiliser prices



Volatile prices: Although certified seeds can often produce higher yields, the cost of external inputs such as fertiliser and irrigation can be so high that they wipe out any additional profits from increased yields. Price volatility means that smallholder farmers using these inputs can face high risks – if prices of inputs go up more than the yield increase from the inputs, then they lose out. Prices have been highly volatile in recent years, which increases the risks for farmers working with small profit margins.

This risk has been starkly illustrated over the past year as this graphic, based on World Bank data on prices of fertiliser (DAP, Urea and MOP) shows. In January 2023, the World Bank reported: “High fertilizer prices have become a significant obstacle to food production in many low-income countries”.¹¹⁰ The head of the Bank warned in December 2022 that “high fertilizer prices are blocking the 2023 and 2024 crop cycle” and that the “challenge is particularly evident in Sub-Saharan Africa”.¹¹¹

Harm soils: A range of studies show that countries with heavy use of chemical inputs can see a plateau effect. Adding more fertiliser does not continue to increase yield indefinitely. One reason for this is that the use of chemical inputs has led to a loss of soil fertility (something discussed in further detail in Section 3.3). In Bangladesh, the use of chemical fertilisers and pesticides since the 1970s ‘Green Revolution’ has seen a reduction in the addition of organic matter to soils. Chemical fertilisers leach through the soil more rapidly than nutrients that originate from composts, manures and other organic sources. A portion of these synthetic nutrients is therefore lost and does not remain available to plants.¹¹² Failure to replenish the soil with organic matter has left soils in many parts of the country lacking sufficient nutrients for agricultural productivity. Unpredictable rains and unexpected weather conditions make it ever more difficult for farmers to plan their production effectively, and depleted soils exacerbate the situation.

Climate emergency: In the age of climate change, another problem is that chemical fertiliser production depends on natural gas. This means continued fertiliser production is incompatible with the urgent need to tackle the climate emergency. When these fertilisers are used, they release nitrous oxide, which is a greenhouse gas that is estimated to be 300 times as potent as carbon dioxide.¹¹³ Bringing together production, transportation and use, synthetic nitrogen fertiliser was calculated to be responsible for 2.1 per cent of total global greenhouse gas emissions in 2018 – mainly from the United States, China, India and Brazil.¹¹⁴ Investing in organic fertilisers that will not release further greenhouse gases into the atmosphere must be a central strategy in tackling the climate emergency.

There are no guarantees that using the combined hybrid seeds and chemical inputs will be successful in the short-term and they can have devastating impacts in the long-term as soil quality is degraded (see Section 3.3). This means that, even if farmers – especially poor farmers – have access to this package, they might not want to use it because it could potentially make them economically worse off than before.

Options available to farmers in Ghana illustrate the point. When the Bank granted Ghana a loan in 2011, it was aware that “farmers are unwilling or unable” to use hybrid seeds and fertiliser “because they are not convinced of the benefits, cannot afford the inputs, or the inputs are not available”.¹¹⁵ These observations were confirmed in a 2021 study on ‘improved’ maize varieties in Ghana. The study found “the wilful refusal to adopt most recommended improved maize varieties could also be explained by the fact that, most farmers in Ghana are financially constrained and cannot afford the recommended agronomic practices attached to these modern seed technologies”.¹¹⁶ The study’s authors noted that, even though farmers were aware that using their own seeds would have a lower yield compared to the certified hybrid seeds, they chose their own seeds.

Even when farmers have been convinced to start using industrial seeds and fertiliser, they might not continue to do so over the long term because they are too expensive:

- In the highlands and lowlands of Manica district in Mozambique, some farmers had been using an ‘improved’ maize seed called SC513. However, one academic study found that their “dissatisfaction with husk cover, susceptibility to storage insect” meant they switched back to local maize varieties.¹¹⁷ This indicates that the seeds were not ‘improved’ according to criteria that mattered to farmers. The study found they also stopped using fertilisers because they could not afford them and feared “their maize production becoming dependent on an input” they could not afford to buy regularly. However, once they had started, farmers were often trapped as even when the fertiliser was “killing” the soil, if they stopped using it, they were seeing that the soil did not produce as much as before.
- In Benin, the government had put in place incentives for farmers to shift to producing crops such as maize instead of traditional crops. However, according to the non-governmental organisation FIAN International, some smallholder farmers saw that it was expensive to buy high-yielding varieties, fertilisers and pesticides so they decided to switch back.

In summary, using industrial seeds and chemical inputs can increase yields but can be unaffordable for smallholder farmers and may have limited impact on increasing farmers’ incomes. Without subsidies, the industrial agriculture model is “just too expensive”¹¹⁹ for many smallholder farmers.

3.2 Commercial seeds often ignore the needs of women farmers

As noted above, farmers might not use hybrid seeds because the “inputs are not available”. This is a problem for all farmers living in areas with poor transport infrastructure, but it is even more of a problem for women farmers. This is because many women may face cultural barriers stopping them going to markets where commercial varieties are sold.¹²⁰

The commercial sector often does not produce seeds that women want to plant. Commercial plant breeders generally focus on cash crops such as maize, rather than food crops such as sorghum or beans.¹²¹ In addition, “...when engaging with smallholder producers, they have often interacted only with men, consequently overlooking traits preferred by women farmers or livestock keepers”.¹²²

“*It’s thanks to the cowpea that this year my children did not have to work in the fields. When the famine [month of food shortage] came I did not have maize or anything ... If we did not have the cowpea the famine would have really affected our family.*”

Niamy Djamou
a farmer in the northern village of Tora¹¹⁸

”

This failure to consider the interests of women farmers means that low-value crops that are important for household nutrition are often excluded from commercial breeding programmes.

Even when women are involved in growing staple crops, they look for different qualities when choosing varieties to plant. For instance, research conducted in Ethiopia and Kenya found that, for commodity crops such as maize, women prioritise different qualities from men when choosing which seeds to plant. Women choose varieties with a smaller grain size, because they are easier to grind into flour. They also choose varieties that store well. The researchers reported that: “Given women’s role as custodians of household food security, ability to store grain well for several months is crucial. Barring financial or other pressures, women and their households expect to store harvested maize grain for as long as possible to assure household supply.”¹²³

While the section above has stressed economic factors, smallholder farmers often have broader criteria than yield when choosing which seeds to use (as discussed in Section 1.1). Women farmers often grow crops for home consumption rather than for selling. Even when growing staple crops such as wheat, women and men often have different concerns. Research from Syria found: “In the case of wheat, it was the men who selected seed on the basis of yield, while women also considered taste, fitness of the grain for the preparation of local dishes, and the quality of straw for use in handicrafts.”¹²⁴

However, criteria such as these are rarely taken into account in formal plant breeding programmes. Although women are actively involved in agriculture, they are often excluded from decision-making. Social norms may mean that plant breeders or commercial seed sellers only talk to men, which means they focus on improving growing qualities rather than considering qualities that affect how a crop can be used. For instance, in Kenya and Ethiopia, ‘improved’ forage varieties were developed that grew close to homesteads. This reduced the time men and boys had to spend grazing their animals but increased the time women and girls spent harvesting the crop for fodder.¹²⁵

3.3 Chemical inputs can damage soils and pollute water

Proponents of chemical inputs such as fertilisers and pesticides in Africa argue that they can help to increase yields.¹²⁶ However, in addition to their costs, as shown above, they can also harm the environment, including reducing soil fertility over the long term.¹²⁷ In fact, the chemical inputs the World Bank is promoting can damage the soil and contaminate the water farmers need to grow food.

Recent studies show that the use of fertilisers and pesticides has been a key driver of soil pollution¹²⁸ and water pollution¹²⁹ in sub-Saharan Africa. In South Africa, the continuous use of nitrogen fertilisers has contributed to soil acidification.¹³⁰ A study on soil fertility in Ethiopia has shown that chemical fertilisers degrade the soil structure and increase soil acidity, which can damage plants and alter soil chemistry.¹³¹ One academic study concluded that the use of expensive chemical fertilisers “damage and render more unproductive, the infertile African soil”.¹³² Although fertiliser rates remain low compared to other regions, there are clear warnings from the United States, Europe and China of the impact of long-term fertiliser use, which cannot be ignored. These include declining soil biodiversity and imbalances in nutrient loading in terrestrial, aquatic and atmospheric systems.¹³³ This has contributed to a slowdown in yield growth.¹³⁴

In the 21st century, the all-chemical seed industry has led to the sterility of arable land, leaving farmers in a precarious situation. Added to this is the supply of new and expensive inputs for the production of seeds protected by intellectual property, which deprives farmers of their freedom as producers. However, with its back to the wall, the productivist logic of the use of synthetic fertilisers and GMOs has only led to soil exhaustion, coupled with a lack of diversity, disruption of ecosystems and loss of biodiversity.¹³⁵

Declaration of the West African Peasants Seed Fair, Senegal, March 2022

A recent study by the European Parliament reported that pesticide use across Africa only accounts for around 2-4 per cent of pesticides used globally.¹³⁶ Nonetheless, in countries such as Kenya there is evidence of respiratory, skin, bone and nervous system problems (in the Lake Naivasha region) arising from pesticide use. Pesticides have also contaminated water and led to declining beneficial insect populations, because these chemicals kill insects indiscriminately and damage their ability to reproduce.¹³⁷ The toxic nature of pesticides is a particular threat to women, who do most of the farming in Kenya. Women often have lower literacy levels than men, which means they are less likely to be able to access information about how to use chemicals safely. The report concludes that smallholder farmers will seek to adopt affordable alternatives to pesticides if they are made available and meet their needs.

The World Bank acknowledges these problems. In a 2022 review, Bank staff wrote: “Over-use or misapplication of mineral fertilizer contributes to environmental problems including nitrate and phosphate water contamination... and increased greenhouse gas emission.... Use of an inappropriate fertilizer for a given soil type and quality can also lead to problems including soil acidification...”.¹³⁸ However, as this quote indicates, the Bank tends to stress that these problems can be overcome by using the right types and amounts of fertilisers.

This is a short-term narrow view that matches the position of large agrochemical companies. For example, a report co-authored by Syngenta in 2010 stated: “Agricultural intensification, if mismanaged, can cause environmental problems relating to reduced biodiversity, over-exploitation of water resources, and agrochemical pollution, including the misuse of pesticides. However, the increase in agricultural activity required in Africa can be made sustainable if modern practices are adapted for local conditions and are coupled to good training and stewardship.”¹³⁹ Companies selling fertilisers and pesticides may try to play down the problems and stress best use. However, in practice, chemical input use is highly inefficient. Globally, the majority of chemical-based fertilisers are not absorbed by plants (two thirds of nitrogen-based fertilisers and around half of phosphorous based fertilisers) and so are responsible for the significant pollution of soils and water sources.¹⁴⁰ Chemical fertiliser production and use is also a driver of greenhouse gas emissions.¹⁴¹

It is time for the Bank to stop repeating the disproven narrative about the need for increased use of chemical inputs. Instead, it should reconsider its approach and start to back agroecological options that meet the needs of smallholder farmers (see Section 4 for more details on this).

3.4 Seed laws can undermine poor smallholder farmers’ access to the seeds they need

Farmers need access to a wide diversity of seeds. If poor smallholder farmers do not have access to different seeds, it reduces their options to build a secure livelihood. This is particularly important for women, who often support their families by growing small quantities of a range of crops, either for eating themselves or for selling in the local market. From this, they may be able to build opportunities to diversify their income sources.¹⁴²

“*Smallholder farmers and indigenous communities, particularly those in centres of origin and diversity, have been guardians of the world’s plant genetic resources for millennia, and they continue to play a crucial role in maintaining the biodiversity of our food crops. Since farmers are custodians and developers of crop genetic diversity in the field, their rights are critical to maintaining this pivotal role in food security.*”¹⁴³

FAO



Photo by Oswaldo Rivas

Farmers in Nicaragua, supported by CAFOD's local partner ASOMUPRO (Asociación de Mujeres Productoras), share bean and corn seeds that are resilient to climate change and have high nutritional value

Access to diverse seeds is enshrined in the UN's International Treaty on Plant Genetic Resources for Food and Agriculture – commonly known as the Seed Treaty – which protects farmers' rights to "save, use, exchange and sell farm-saved seed and propagating material".¹⁴⁴ This has been signed by 147 countries.¹⁴⁵ However, these rights are often not upheld, and seed laws promoted by the World Bank threaten to further undermine these rights. The UK is a signatory to the Seed Treaty¹⁴⁶ and should therefore use its role as a significant shareholder at the Bank to ensure Bank finance and policies are compatible with it.

As part of upholding farmers' rights as set out in the Seed Treaty, the FAO recommends "Laws and policies pertaining to seeds, agriculture and the environment, as well as their related procedures, may be created or amended to support the realization of Farmers' Rights".¹⁴⁷ There are examples of seed laws from around the world that do seek to uphold farmers' rights. These include seed laws in India,¹⁴⁸ Brazil,¹⁴⁹ Bolivia,¹⁵⁰ Venezuela,¹⁵¹ the Philippines,¹⁵² Nepal¹⁵³ and Ethiopia¹⁵⁴

Unfortunately, the purpose of many seed laws is to restrict which seeds are sold commercially, so that only certified seeds are available on the market.¹⁵⁵ They are designed to ensure that the commercial seed sector works properly. But they can have the impact of making it much harder for farmers to use their own seeds or develop their own new varieties. It is very difficult for smallholder farmers to get their seeds certified, which means that their seeds cannot be made available through the commercial seed sector (see Box 11 for more detail). The Bank says that seed laws can increase access to hybrid seeds, but in practice they can reduce farmers' access to the wide variety of seeds previously shared through the farmer seed system.



Young agriculturalists in Sierra Leone learn to grow tomatoes and sweet peppers using environmentally sustainable agricultural practices. They also learn marketing and how to build their businesses.

Box 11 Why can't farmers get their own seed varieties certified?

Theoretically, smallholder farmers and small-scale seed producers could register their seeds and have them included in national catalogues. They would then be able to sell them which would contribute to improving their incomes. But the laws and regulations are designed to protect commercial varieties and, as we have seen, seeds can only be certified if they meet the criteria of being "(i) new, (ii) distinct, (iii) uniform, (iv) stable ...".¹⁵⁶

'New' is defined as not previously commercially available (rather than not previously existing); 'distinct' means distinguishable from other varieties; 'uniform' requires all plants in a variety to have the same characteristics; stable means it maintains its characteristics after repeated propagation.¹⁵⁷

The importance and value of farmer varieties arises because they are diverse and adapt to the conditions in which they are growing. By definition, this means that they do not meet the criteria, particularly of stability and uniformity. It is therefore unlikely, in practice, that farmer varieties would pass the tests they need to be registered.

Another hurdle is that seed catalogues apply at the national level. It is unlikely that farmers' seeds will perform well in national trials because they are often adapted to local conditions. The varieties admitted to the catalogues are those that perform well 'on average' but may not meet the needs of farmers in all regions.¹⁵⁸

On top of that, the process of getting a seed certified is time-consuming (it can take up to three years) and expensive. It is often only possible to register a variety in national offices in the capital city, which adds to the cost and difficulty for farmers in remote areas. The costs also mean that crop breeders will only certify varieties of crops that sell in large quantities. This means that commercial breeders focus on staples crops that are widely grown and respond to the needs of richer farmers with more purchasing power.

The commercial sector does not serve the needs of poorer farmers, who often farm in more diverse ecological conditions, requiring small quantities of specialist seeds. Instead, as researcher Niels Louwaars reported: "Seed certification and quality control regulations tend to turn farmers' seed production and particularly the exchange and sale of farm-saved seed into illegal activities and put severe restrictions on initiatives that support farmers' seed systems."¹⁵⁹

Certification restricts farmers' ability to develop their own varieties, but at the same time, offers no protection to farmers' ownership of the varieties they have developed. Because 'new' is defined as not previously commercialised, breeders can take a variety that is widely used by farmers and shared in the farmer seed system and then claim it as a new variety, market it, sell it back to farmers and make it illegal for them to share it in their own fields. Seed laws do not protect farmers against this form of 'appropriation' – also called biopiracy.¹⁶⁰

These conditions mean that the laws favour commercial crop breeding over farmer seed systems and tend to reduce genetic diversity. As the African Centre for Biodiversity concluded these criteria encourage "genetic homogeneity and cannot be used to protect more diverse plant varieties, traditional varieties or cultivated land races."¹⁶¹

While seed laws in some countries distinguish between the commercial (or formal) market and farmer-led (or informal) market, they often contain grey areas and much room for interpretation.¹⁶²

For instance, the Ghana 2020 Plant Variety Protection Act¹⁶³ creates uncertainty and insecurity for farmers. Edwin Baffour from Food Sovereignty Ghana said in late 2022: "In an unprecedented manner, Ghana is proposing and telling the world that anyone who is found exchanging, saving or selling patented seeds can get a minimum sentence of 10 years. Almost 50 per cent of the population of Ghana are somehow connected to farm work, [and] if this kind of very rigid 10-year minimum sentence is going to apply, even for those of us who work in the industry it is difficult to recognize a pile of GM cowpeas and a pile of conventional cowpeas. So, there's a very big grey area and it's an uncomfortable situation we find ourselves in."¹⁶⁴ This law builds on the 2010 Plants and Fertilizer Act, which the World Bank backed through its financing to Ghana between 2011 and 2012.

This model has also been followed in Kenya, where a law was passed in 2012 that prohibits farmers' rights to save, share, exchange or sell unregistered seeds. Farmers could face up to two years in prison and a fine of up to 1 million Kenyan shillings (equivalent to nearly four years' wages for a farmer).¹⁶⁵ In 2022, Kenyan smallholder farmers launched a legal case against the government calling for reform of the 2012 seed law¹⁶⁶ to stop criminalising them for sharing seeds.

Under Kenyan regulations “formal and informal actors are recognized, but the informal sale of seeds is limited to non-commercial varieties”.¹⁶⁷ This uncertainty has a chilling effect on farmers’ activities. As a 2021 FAO review of the implementation of seed laws around the world found, these laws were not always enforced when unregistered varieties were sold. However, the review points out that “the lack of enforcement of regulations that bar the commercialization of certain seeds does not necessarily mean that such regulations have no effect. Even where regulations are not enforced, citizens may refrain from forbidden actions, such as the marketing of unregistered farmer seed varieties, in order to comply with the law or directive.¹⁶⁸ There also are worrying examples from other countries, which show what could happen in African countries (see Box 12).

It does not have to be this way. The World Bank can learn from other options that exist for countries to develop seed laws that uphold farmers’ rights, and that work for their context and agricultural system.

In the early 2000s, the African Union developed the African Model Law for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources.¹⁶⁹ However, this more progressive proposal, which would have upheld the rights of farmers, was not implemented by African governments through national legislation.¹⁷⁰ At the time the model law was being debated, it was criticised by UPOV (see Box 8 in section 2.2) and the World Intellectual Property Organization, which objected to the model law’s proposal to make breeders’ rights subordinate to farmers’ rights, and the proposed prohibition on patent protection of any life form.¹⁷¹

More recently, in 2022, European Union legislation came into force that allows organic seeds from heterogeneous populations to be sold. This means that organic seeds can be sold that are adaptable to site conditions and to variable weather conditions. This law applies only to the organic sector and operates alongside the strict regulations (that varieties must be distinct, uniform and stable) that apply to the rest of the commercial sector. This example shows that it is possible to develop regulatory frameworks for the use of diverse seeds that serve the interests of different groups and communities.¹⁷²

Box 12 Examples from around the world – the impact of seed laws

- In Colombia, there was outcry after a seed law was passed that pushed farmers towards buying seeds that were patented by agribusiness and limited farmers’ access to native and creole seeds. The law, known as Resolution 970,¹⁷³ was passed as part of the Free Trade Agreement with the United States in 2010. In 2010 and 2011, the Colombian Agricultural Institute and government confiscated and destroyed crops that it alleged originated from non-certified seeds.¹⁷⁴ This contributed to a backlash and the 2013 National Agrarian Strike that helped to halt Resolution 970. It was replaced by Resolution 3168, which is extremely ambiguous and did not solve any of the issues of Resolution 970.¹⁷⁵
- In other countries, farmers have been fined and even imprisoned for patent infringements. For instance, Monsanto pursued farmers in the United States and Canada in the early 2000s, receiving up to US\$160 million in out-of-court settlements by 2006 and US\$23.7 million in court judgments by 2013. There are documented cases of DuPont hiring private detectives to search farmers’ fields for saved seeds,¹⁷⁶ and of farmers serving prison sentences for seed-saving.¹⁷⁷
- Indonesia is introducing laws that could land farmers with fines up to 1 million Indonesian rupiahs (around a month’s wages for a farm labourer) or imprisonment for up to ten months.¹⁷⁸
- In India, PepsiCo attempted to sue a farmer in 2019 for using a potato variety it owned. The farmer was unaware that the variety was patented. PepsiCo sued for 10 million rupees – around £120,000 – from a farmer with an annual income of about £3,000. The case was eventually dropped after huge protests.¹⁷⁹ PepsiCo’s patent has subsequently been revoked by the Indian government,¹⁸⁰ but PepsiCo is appealing this decision.¹⁸¹

SECTION 4 The World Bank should support an agroecological transition



Summary

It is time for the Bank to recognise that its narrow approach does not meet the needs of all farmers and is not working overall to reduce poverty and increase food security. The Bank needs to support farmers to build a more resilient food system, by backing a diverse range of approaches, and by supporting farmer seed systems. In this section, we call on the World Bank to create an enabling environment for an agroecological transformation.

4.1 It's time for a rethink

Our evidence shows that the World Bank has pushed farmers to use hybrid seeds and chemical inputs, and has been prepared to back costly subsidy schemes and controversial seed laws to expand the commercial inputs sector. According to the Oakland Institute, the Bank has been “orchestrating the privatization of seed systems and discrediting farmers’ seeds for the sake of corporate profit”.¹⁸² This is not consistent with the objective of making sure there is enough food for everyone. It’s time for a rethink.

As a publicly funded institution with a mission to end poverty, the Bank must engage with and take the lead from the poorest farmers. In a 2001 rural development paper on how to design seed and fertiliser regulation, World Bank staff wrote “farmers are not all interested in the same varieties”.¹⁸³ However, instead of factoring this into its work, the Bank has continued to support the expansion of the commercial seed sector, to the detriment of farmer seed systems. The majority of commercial actors focus on expanding sales of seeds of staple crops sold on global markets and pay much less attention to crops of interest and relevance to smallholder farmers. The different priorities of women farmers, in particular, receive little attention from commercial breeders, as we have already discussed above.



*Never before has there been a more coordinated and better funded attempt to transform Africa’s peasant based agriculture into a commercial enterprise. These initiatives are taking place without any consultation with farmers in Africa. Indeed, they pointedly ignore the millions of smallholder farmers in Africa who depend on agriculture for their livelihoods, with the vast majority, using farm-saved seed to ensure their food security. The combined effect of these initiatives is to hand over Africa’s food and seed sovereignty to foreign corporations, reducing the availability of local plant varieties, weakening Africa’s rich biodiversity, and denying millions of farmers the right to breed and share crops needed to feed their families.*¹⁸⁴

Alliance for Food Sovereignty in Africa (AFSA) Chair
Bern Guri, 2013



This narrow market-focused approach ignores the many other criteria that matter for farmers when choosing what to grow. These factors include access to seeds, availability in markets they can reach, reliability of yields, lower costs, reduced risks associated with using inputs, taste, cooking qualities and nutritional value. Farmers may also take into account the interaction of plant varieties with environmental factors and soil conditions or choose inter-cropping techniques that enable them to get the most productivity out of their small plots. These factors are not taken into account when seed yields are measured in 'ideal' conditions by crop breeders.

New metrics are needed to measure the productivity of a piece of land. Metrics must go beyond yield to take account of other costs or income-generating opportunities. For instance, if a crop residue can be used as animal fodder, that will help to reduce household costs. Similarly, using stalks for handicraft production can provide another source of income for households. The indicators used to measure the usefulness of a crop variety must be more holistic, measuring qualities that are relevant for small-scale farmers, who use many different strategies to build diverse income streams to support their families.

These approaches create multiple benefits, and enable farmers to take a holistic approach, recognising the multiple functions of agriculture within a community – from producing food, fodder and fuel to biodiversity conservation, water management and soil building. Agroecological approaches, in particular, help farmers to address multiple Sustainable Development Goals (SDGs) simultaneously. Agroecological approaches have been shown to build synergies between environmental, social and economic goals to build resilient and sustainable livelihoods and strong local economies.¹⁸⁵

As we highlighted at the start of this report, to maintain yields, healthy ecosystems and diverse livelihood strategies, smallholder farmers rely on a wide diversity of plant varieties, which have been selected over many generations for their quality and suitability to local conditions. Farmers should be the primary stakeholders when seed policies are designed, but seed laws drafted to regulate the commercial seed sector have often ignored their interests.¹⁸⁶ The World Bank has exacerbated this problem through its bias towards the interests of agribusinesses. For instance, its Enabling the Business of Agriculture rankings (2013-21) almost completely ignored farmer-managed seed systems, even though they provide 80-90 per cent of the seeds used in the global South. This "one-size-fits-all approach does not help governments implement solutions adapted to farmers' needs".¹⁸⁷ The Bank must shift its focus to the needs of farmers.

4.2 The case for agroecology

The model of hybrid seeds plus chemical inputs promoted by the Bank is not the only way to increase productivity and crucially other approaches can better meet smallholder farmers' diverse needs, including building natural resources and farming sustainably. The World Bank must start supporting the transformation we need in agricultural production.

We have seen agroecological practices improve the fertility of soils degraded by drought and chemical input use. We have seen producers' incomes increase thanks to the diversification of their crop production and the establishment of new distribution channels. We have seen local knowledge enriched by modern science to develop techniques inspired by lived experience, with the capacity to reduce the impacts of climate change. And we have seen these results increase tenfold when they are supported by favorable policy frameworks, which place the protection of natural resources, customary land rights, and family farms at the heart of their action.

Papa Abdoulaye Seck, Ambassador of Senegal to Italy, Permanent Representative of Senegal to the FAO, Former Minister of Agriculture and Rural Equipment of Senegal¹⁸⁸



Photo by Amit Rudro

Rupali lives in an eco-village in southern Bangladesh. CAFOD's local partner organisation, the Bangladesh Association for Sustainable Development, supports these villages where families work together to use organic pesticides, share seeds, and grow different varieties of crops and vegetables

There is an abundance of evidence showing that agroecological approaches are successful when it comes to reducing poverty for small-scale farmers, who are able to increase their incomes while at the same time strengthening their resilience to economic and climate shocks. When farmers take steps towards agroecological production, such as reducing external inputs and using organic farm management practices, they reap the benefits. We highlight some of these positive impacts below, showing where farmers have achieved: a) increased yields, b) increased income and cost savings, c) increased access to local markets, d) increased resilience to climate change and price shocks, and e) increased soil fertility, which is the bedrock for sustainable agricultural production.

Increased yields

A 2021 study examined five case studies of organic management practices on 1,645 farms in Kenya and Ghana over a two-year period. The study found that, in four cases, overall yields and gross margins from organic approaches were similar to conventional approaches, while in the fifth “coffee, maize and macadamia nut yields increased by 127–308% and farm-level gross margins over all analysed crops by 292%”.¹⁸⁹ The authors conclude that, if organic approaches are implemented well, they can increase yields significantly. However, farmers need support to secure appropriate inputs and market access. This is what the Bank could be supporting.

A 2005 report analysed interventions in the global South covering around 37 million hectares. In the 12.6 million hectares where farmers were implementing sustainable agriculture approaches, such as efficient water use and reduction in pesticides, there were increases in yields for cassava, sweet potato, soybean, groundnut, maize, millet, sorghum, potatoes, legumes (beans, cowpea, chickpea), but not for rice.¹⁹⁰

The Bank could build on examples of successful collaboration between governments and smallholder farmers in areas such as supporting alternatives to synthetic fertilisers including biofertilisers.¹⁹¹ In Senegal, Burkina Faso, Ghana, Niger and Mali, farmers’ organisations are collaborating with the government on agro-forestry initiatives in dryland areas that have restored soil fertility and increased yields by 40-100 per cent over a five-year period.¹⁹²

Cost-savings and increased income

In India, ongoing evaluations of a Government of Andhra Pradesh programme (Andhra Pradesh Community Managed Natural Farming system) show it continues to be a low-cost and water efficient approach that deliberately does not rely on expensive chemical inputs such as pesticides. The use of indigenous seeds is a key element of the programme, which works with six million farmers and covers eight million hectares. In the most recent report covering 2021-22, it was found that there were costs savings across a range of crops and especially for chillies, cotton and tomato.¹⁹³

In densely populated areas of Oromia region in Ethiopia, a five-year project with 1,000 households (around 5,000 people) adopted measures such as agroforestry, soil fertility enhancement through composting, intercropping and crop rotation, organic pest management, post-harvest management and improved animal management. This resulted in increased use of diverse crop varieties, which improved diets (more vegetables) and reduced exposure to the risk of crop loss, thus boosting resilience. The average annual household income reported in the baseline survey was 679 Birr (US\$35) in male-headed households and 642 Birr (US\$33) in female-headed households. The survey at the end of the project found that participating households were earning incomes of 9,352 Birr (US\$481) and 8,356 Birr (US\$429) respectively.

In Senegal, Burkina Faso, Ghana, Niger and Mali, farmers’ organisations are collaborating with the government on agro-forestry initiatives in dryland areas that have restored soil fertility and increased yields by 40-100 per cent over a five-year period.

Box 13 Smallholder farmers reaching urban markets in Brazil

For the past 20 years, CAFOD has been working in Brazil with our local partner organisation – the Pastoral Land Commission of João Pessoa (CPT-JP) – to support small-scale farmers who are running small agroenterprises to produce and market their crops sustainably. Farmers connect directly with urban consumers through local marketing networks such as agroecological fairs. They deliver affordable, safe and nutritious food and create jobs for rural families. CPT-JP also helps farmers to work with local governments to improve their policies. With CPT-JP's support, farmers have negotiated access to the state's local purchasing systems to supply public institutions

such as schools. During the Covid-19 pandemic, these marketing networks were vital in helping meet the nutritional needs of poor families when markets were closed. CPT-JP's approach supports both farmers and urban consumers and helps to address structural issues like access to land, contributing to building a sustainable and fair local food economy.



CAFOD's partner in Brazil, the Pastoral Land Commission in João Pessoa, supported a farmers' network to sell their organic produce safely at local markets during the Covid-19 pandemic

Increased resilience to climate and price shocks

Backing agroecological approaches will also increase resilience to climate change. It is counterproductive for the Bank to identify vulnerabilities to climate change in the food system and then reinforce those problems by promoting chemical inputs that rely on fossil fuels such as natural gas.

An FAO report from 2020 concluded that “robust scientific evidence demonstrates that agroecology increases climate resilience”.¹⁹⁴ A more recent study commissioned by the UK's Foreign and Commonwealth Development Office found that agroecological approaches can be beneficial in supporting farmers to adapt to climate change.¹⁹⁵

The FAO report has recommendations to donors and decision-makers that are particularly pertinent for the Bank. These include:

- “There are no ‘one-size fits all’ solutions, no silver bullets: consider individual contexts and local knowledge, building on the ten elements of agroecology”, and
- “Acknowledge that the current knowledge base is robust enough to support agroecology as an effective climate change adaptation strategy and strengthening farmers' resilience.”

In Tanzania, one study found that smallholder farmers in one region adopted agroecological practices, which increased their production, lowered costs for inputs and protected the environment.¹⁹⁶ One farmer told the study authors: “When we used agrochemicals, plants used to become bad in summer season. They turn to yellow color. But after starting organic farming with fertilizer of animal manure, plants are okay even under strong sun. They grow well. Moreover, vegetables do not get so many diseases as many as they used to have when we used agro-chemicals.”

These findings are confirmed by earlier studies. A 2008 UN study looked at 15 case studies in East Africa and found that, in the vast majority of cases, applying organic methods led to substantial benefits in terms of per hectare productivity, household incomes, poverty reduction, food security, water supply, flood control, soil fertility and overall biodiversity.¹⁹⁷ The report noted that the 2008 spike in food prices showed the urgent need to reduce dependence on external inputs and instead scale up organic approaches because these “agricultural methods and technologies are ideally suited for many poor, marginalized smallholder farmers in Africa, as they require minimal or no external inputs, use locally and naturally available materials to produce high-quality products” and increase overall resilience. The authors lamented that, in most African countries, organic agriculture received insufficient backing and that actually it was often undermined by “policies advocating the use of high-input farming management practices”.

Box 14 Enriching soil fertility in Bangladesh

In Bangladesh, since the late 1970s, chemical fertilisers and pesticides have been subsidised as part of the ‘Green Revolution’. The subsidies have led to an over-dependence on and indiscriminate application of chemical fertilisers and pesticides. This has damaged water quality and human health, and left soils in many parts of the country depleted, and unable to support agricultural productivity.

CAFOD’s Church partner Caritas Bangladesh has developed a programme, working with others, to help farmers rebuild the soil fertility. They have introduced farmers to vermicompost – a nutrient rich, organic fertiliser produced by earthworms. As a result of producing and using the vermicompost, farmers witnessed an improvement in soil fertility, including a reduction in harmful pests and diseases. Community-based structures have been set up to support the sale and marketing of vermicompost, so farmers have been able to sell their compost to other farmers, spreading the positive impact and increasing their incomes. Women have been at the heart of these businesses enabling them to contribute to household expenses and their children’s education. In Bangladesh, women have traditionally not been able to engage in business ventures, so this is an important change for many of them.

In summary, these studies show the Bank has other options beyond promoting the use of hybrid seeds and chemical inputs. There are other ways to increase productivity, improve farmers’ incomes and reduce poverty and hunger.

Conclusion and recommendations

The World Bank's approach to agricultural development is too narrowly focused on industrial agriculture and is not tackling poverty nor meeting the needs of poor small-scale farmers. Its 'one size fits all' approach is failing to respond to the diverse realities of countries in the global South. It has serious shortcomings and has been repeatedly called into question by staff inside the Bank, as well as numerous governments, international institutions, farmers, practitioners and academics.

The model is focused on the wrong metrics – prioritising measuring private sector involvement in seed and fertiliser markets over evidence of tackling poverty, which is the Bank's main mission, or increasing food security.

It is too focused on potential short-term benefits through increased use of hybrid seeds and chemical fertiliser and does not sufficiently consider the longer-term impacts on soil health and water systems, nor the climate impacts of using fossil fuel-based inputs. It also sidelines the specific needs of women and how they engage in agricultural production.

Subsidies may help farmers to afford inputs initially but seeds and fertilisers are often not affordable for farmers in the long term. Any increased yields in the short term can be undermined by rising costs, leading to a reversal of any financial gains. Subsidies are also draining on government resources as these programmes are notoriously difficult to end once they have started.

The promotion of formal seed systems, which support commercial breeders to have greater access to seed markets, is having devastating consequences. It is limiting access to farmer seed systems on which 80 per cent of farmers in Africa rely for their crops and is further excluding women from income-generating opportunities. It has contributed to a reduction in crop diversity, which is essential for food security, healthy diets and to increase the resilience of smallholder farmers in the face of shocks such as climate change, Covid-19 and conflict. Furthermore, seed certification laws across the world are criminalising farmers who propagate, grow, exchange and sell seeds as they have done for generations.

In an age of constant shocks to the food system, farmers need approaches that will work in the short term at the same time as helping them move to farming systems that will ensure environmental sustainability, crop diversity and productivity in the long term – as well as helping them to feed their own families.

The World Bank needs a wholesale shift of its support away from a singular focus on an industrialised agricultural model towards diverse models of agricultural production. In order to fulfil its mission to eradicate poverty, it needs to support an agroecological transition with the rights of small-scale farmers at the heart of the solution.



Photo by Ibrahim Illiassou

A women's group in Niger has received training in how to grow and conserve Moringa trees and harvest their seeds, which they use to purify the community's drinking water and protect their families' health.

This report has highlighted four priority areas for change:

1. Stop supporting restrictive seeds laws

The World Bank should immediately stop supporting narrow, restrictive seed laws that limit the access of smallholder farmers to seeds from both commercial and farmer-led seed systems. Instead, its starting point should be to support policies that uphold farmers' rights to save, share, exchange and sell their seed varieties, as set out in the International Treaty on Plant Genetic Resources for Food and Agriculture.

Enabling countries to choose context-specific seed laws and approaches to agricultural development is more likely to lead to a range of complementary approaches that include farmer seed systems alongside commercial systems that regulate the sale of seeds for commodity crops. Such an enabling environment would make sure farmers have real choice when deciding what seeds to use, what crops to grow, and in which markets to participate. It would support them to adapt and develop the most appropriate strategies to tackle hunger and increase food security.

- Stop putting conditions on financing that limit a country's choice regarding how to regulate its seed sector.
- Stop promoting subsidies for high-yield variety seeds and fertiliser packages, including through putting conditions on financing.

2. Invest in an agroecological transition

The World Bank needs to shift its focus from large-scale agribusiness to diverse models of agricultural production. There needs to be an immediate and massive repurposing of billions of dollars of public finance away from backing the industrial agricultural model based on hybrid seeds and chemical fertilisers towards sustainable and resilient production models, based on agroecological principles. As part of this, the World Bank should end assistance for the production and use of fossil fuel-based fertiliser and take actions to break the dependency of agricultural production on fossil fuel-based inputs.

Backing for this agroecological transition will include channelling funding to help national agriculture initiatives that support farmers to move to agroecological production, including training, capacity building, research and growing local markets – building on guidance developed by FAO to support the transition to agroecology.¹⁹⁸

- Stop supporting the production and use of fossil fuel-based fertiliser and take actions to break the dependency of agricultural production on fossil fuel-based inputs.
- Channel funding to help national agriculture initiatives that support farmers to move to agroecological production, including training, capacity building, research and growing local markets – building on guidance developed by the FAO to support the transition to agroecology.¹⁹⁹

3. Support farmer seed systems

A transition to agroecological production starts with strengthening vibrant and diverse seed systems. As we have shown, strong farmer seed systems are vital for building food security and reducing poverty. They underpin sustainable and climate resilient food production and are a key component of diverse livelihood strategies, including for women.

The World Bank needs to work with farmers, civil society groups, businesses, academics, governments and other international institutions to scale up its investment in these diverse seed systems. This includes supporting the development of a policy environment that recognises and promotes seed diversity and farmer seed systems as well as practical actions, such as supporting participatory plant breeding, community seed banks and other community level initiatives to protect and develop crop diversity.

- Take actions to uphold farmers' rights to save, share, exchange and sell seeds, as set out in the International Treaty on Plant Genetic Resources for Food and Agriculture (the Seed Treaty).
- Support countries to develop legal and regulatory frameworks that support farmer seed systems alongside the commercial seed sector, recognising that complementary seed systems can operate alongside each other to meet the needs of different populations e.g. development of different standards for farmers' varieties.
- Channel funding to support participatory plant breeding, community seed banks and other community level initiatives to protect and build crop diversity. Ensure such initiatives recognise and strengthen women's roles in conserving and developing seeds.
- Use its resources to increase support for farmer-led seed systems, building on policy options proposed in FAO's options paper.²⁰⁰

4. Measure what matters

Instead of measuring the increased activity of the private sector in hybrid seed and chemical fertiliser markets as a proxy of agricultural development, the World Bank should measure what matters to farmers. It should measure what can be more directly related to the Bank's mission of ending extreme poverty within a generation. These measures include increased incomes; market access; reduction in levels of poverty, hunger and malnutrition; gender equity; soil and water quality; access to indigenous seeds; and crop diversity. The World Bank should:

- Stop using proxy indicators, such as the expansion of the commercial seed sector, to measure the impact of their programmes.
- Develop policy instruments based on poverty reduction and food security criteria, not proxy measures such as the expansion of agribusiness companies' activities.
- Develop metrics and indicators that provide a meaningful measure of the impact of their policy prescriptions on poverty, food security and gender equity.
- Ensure, and demonstrate, that their conditions and policy prescriptions are in line with international agreements for instance on climate, gender and the Sustainable Development Goals (SDGs).
- Not re-instate the 'Enabling the Business of Agriculture' index.

The UK government is a Board member and major shareholder in the World Bank. We call on the UK to act in that role, and in its wider trade and development policies to support a transformation of our food system to build long-term food security and reduce poverty. The UK government should:

- Use its influence and vote in the World Bank to end support for restrictive seeds laws and ensure a shift in World Bank investments to support an agroecological transition.
- Uphold its international obligations: As a signatory to the International Treaty on Plant Genetic Resources for Food and Agriculture (the Seed Treaty – see Section 3.4), the UK should uphold farmers' rights and must not put conditions in trade agreements that push countries to sign up to restrictive seed laws such as UPOV91 (see Box 8, Section 2.2). The UK should also ensure its actions contribute to achieving the SDGs and globally agreed climate targets.
- Scale up investment in an agroecological transition: Shift public finance, including UK Aid, towards agroecological production approaches that start with farmer seed systems; that focus on producing diverse nutritious crops in sustainable ways; and that build climate resilience, support local markets and secure land rights.

References

- 1 Dorosh P and Thurlow J (2018) 'Beyond agriculture versus non-agriculture: decomposing sectoral growth-poverty linkages in five African countries' in *World Development*, vol 109, pp 440-451.
- 2 World Bank (2022) [Fact Sheet: An adjustment to global poverty lines](#) (accessed 30.3.23)
- 3 IFAD (n.d.) [Why rural people?](#) (accessed 12.4.23)
- 4 FAO (2021) [News Article: Small family farmers produce a third of the world's food](#) (accessed 12.4.23)
- 5 See examples throughout the report, including sections 2.1, 3.3, and 4.1
- 6 Dutfield G (2008) 'Turning Plant Varieties into Intellectual property: The UPOV Convention', in Tansey G and Rajotte T (eds) *The Future Control of Food. A Guide to International Negotiations and Rules on intellectual Property, Biodiversity and Food Security*, London, Earthscan.
- 7 FAO Commission on Genetic Resources for Food and Agriculture (2021) 'Impact of implementation of seed legislation on diversity of plant genetic resources for food and agriculture'. CGRFA/WG-PGR-10/21/3 Inf.1, Rome, FAO.
- 8 Munyi P and De Jonge B (2015) 'Farmers' and breeders' rights: Bridging access to, and IP protection of, plant varieties in Africa' in *The African Journal of Information and Communication*, Issue 16
- 9 Kahaso Dena H (2022) 'Farmers file a court case to stop punitive seed laws', Greenpeace press release. (accessed 30.3.23)
- 10 Louwaars N P and de Boef W S (2012) 'Integrated Seed Sector Development in Africa: A Conceptual Framework for Creating Coherence Between Practices, Programs, and Policies' in *Journal of Crop Improvement*, vol 26(1), pp 39-59.
- 11 Walter S (2021) 'The Legal Regimes Governing Seeds and the Future of Agriculture—Conservation, Access, and Ownership', Working Paper of the Global Restoration Project.
- 12 Camacho Villa T, Maxted N, Scholten M, Ford-Lloyd B (2005) 'Defining and identifying crop landraces' in *Plant Genetic Resources*, vol 3(3), pp 373-384.
- 13 CBAN (2023) [GM/GE Definition](#). (accessed 30.3.23)
- 14 Sirinathsinghji E (2022) [BT Crops past their sell-by date: a failing technology searching for new markets?](#) Penang, Third World Network. (accessed 12.4.23)
- 15 Mbow C, Rosenzweig C, Barioni L et al (2019) 'Food Security in Shukla P, Skea J, Calvo Buendia E et al (eds) *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*, Geneva, IPCC.
- 16 IPES-Food, IFOAM, Agroecology Europe et al (2021) 'A unifying framework for food systems transformation: a call for governments, private companies and civil society to adopt 13 key principles' IPES-Food (accessed 30.3.23)
- 17 FAO (2023) 'What is agroecology?' (accessed 30.3.23)
- 18 Khoury C et al (2014) 'Increasing homogeneity in global food supplies and the implications for food security' in *PNAS* 111(11), pp 4001-4006.
- 19 Bélanger J and Pilling D (eds) (2019) *The State of the World's Biodiversity for Food and Agriculture*, Rome, Commission on Genetic Resources for Food and Agriculture, Food and Agriculture Organization of the United Nations, quoted in Fakhri M (2022) 'Seeds, right to life and farmers' rights', A/HRC/49/43, United Nations General Assembly.
- 20 Mbow C, Rosenzweig C, Barioni L et al (2019) op. cit.
- 21 Wise T (2020) *Failing Africa's Farmers: An Impact Assessment of the Alliance for a Green Revolution in Africa*, Medford MA, Global Development and Environment Institute, Tufts University (accessed 30.3.23)
- 22 Anderson T and Campeau C (2013) *Seeds for life: scaling up agro-biodiversity* Ecumenical Advocacy Alliance and Gaia Foundation. (accessed 12.4.23)
- 23 Access to Seeds Index (2019) 'Global Seed Companies' (accessed 30.3.23)
- 24 IPES Food (2016) *From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems* International Panel of Experts on Sustainable Food Systems. (accessed 30.3.23)
- 25 FAO (2019) 'The biodiversity that is crucial for our food and agriculture is disappearing by the day', FAO News. (accessed 30.3.23)
- 26 ETC Group (2022) 'Food Barons: agrochemicals and commercial seeds' (accessed 30.3.23)
- 27 Access to Seeds Index (2019) 'Synthesis Report' (accessed 30.3.23)
- 28 Howard P (2015) 'Intellectual Property and Consolidation in the Seed Industry' in *Crop Science* vol. 55 pp.1-7. (accessed 30.3.23)
- 29 ETC Group (2022) *Food Barons 2022: Crisis profiteering, digitalization and shifting power* (accessed 30.3.23)
- 30 World Bank (2007) *World Development Report 2008: Agriculture for Development*, Washington DC, IBRD/World Bank. (accessed 30.3.23)
- 31 Torshizi M and Clapp J (2021) 'Price Effects of Common Ownership in the Seed Sector' in *The Antitrust Bulletin*, vol 66 (accessed 30.3.23)
- 32 ETC Group (2022) Food barons: agrochemicals and commercial seeds.
- 33 Parliamentary Office of Science and Technology (2016) 'Intellectual Property and Plants', POSTnote no. 517. (accessed 30.3.23)
- 34 Stevens S and Jenkins P (2014) 'Heavy costs: Weighing the value of neonicotinoid insecticides in agriculture', Washington DC, Center for Food Safety, quoted in Howard P (2015) op. cit.
- 35 Stevens S and Jenkins P (2014) op. cit.
- 36 Howard P (2015) op. cit.
- 37 ISAAA (2014) 'Global Status of Commercialized Biotech/GM Crops: 2014' Brief 49, ISAAA. (accessed 30.3.23)
- 38 Center for Food Safety (n.d.) 'The Role of GE Seeds and the Patent System' (accessed 30.3.23)
- 39 Fakhri M (2022) 'Seeds, right to life and farmers' rights', A/HRC/49/43, United Nations General Assembly.
- 40 World Bank (2007) op. cit.
- 41 World Bank (2007) op. cit.
- 42 World Bank (2005) 'Review of World Bank Conditionality', Operations Policy and Country Services, World Bank (accessed 30.3.23)
- 43 World Bank (2012) 'Malawi program information document (PID)' Washington DC, World Bank (accessed 30.3.23)
- 44 World Bank (2007) 'Africa's Growing Soil Fertility Crisis: What Role for Fertilizer?' in *Agricultural and Rural Development Notes* Issue 21. (accessed 30.3.23)
- 45 Tups, G (2022) *Golden bullet or bad bet? New dependencies on synthetic fertilisers and their impacts on the African continent* Berlin, INKOTA. (accessed 30.3.23)

- 46 Jayne T, Mason N, Burke, W and Ariga J (2018) 'Review: Taking stock of Africa's second-generation agricultural input subsidy programs' in *Food Policy*, vol 75 pp1-14.
- 47 Independent Evaluation Group (2019) '[Implementation Completion Report \(ICR\) Review – Mali](#)' in Poverty DPO Series (P157900) (accessed 30.3.23)
- 48 World Bank (2021) '[Implementation Completion and Results Report on a Development Policy Grant to the Republic of Mali](#)' Report no: ICR00005219 (accessed 30.3.23)
- 49 World Bank (2020) '[Implementation Status and Results Report on Mali Sustainable Energy and Improved Service Delivery for Increased Stability Development Policy Financing \(P167547\)](#)' (accessed 30.3.23)
- 50 World Bank (2018) '[Financing Agreement between Republic of Niger and International Development Association](#)' (accessed 30.3.23)
- 51 World Bank (2022) '[Implementation Completion and Results Report on a Development Policy Credit and on a Development Policy Loan to the Republic of Kenya](#)' Report no: ICR00005801 (accessed 30.3.23)
- 52 World Bank (2022) '[Implementation Completion and Results Report on a Development Policy Credit to the Republic of Guinea](#)' Report no: ICR00006096 (accessed 30.3.23)
- 53 World Bank (2007) *World Development Report 2008: Agriculture for Development*, Washington DC, IBRD/World Bank. (accessed 30.3.23)
- 54 World Bank (2007) op. cit.
- 55 Jayne T et al (2018) op. cit.
- 56 Tups G (2022) op. cit.
- 57 World Bank (2014) '[Agribusiness Indicators: Synthesis Report](#)', Agriculture Global Practice Discussion Paper 1, Washington DC, World Bank Group. (accessed 30.3.23)
- 58 Independent Evaluation Group (2018) '[Implementation Completion Report \(ICR\) Review – Malawi Agri Support and Fiscal Management DPO](#)' (P153753) (accessed 30.3.23)
- 59 Independent Evaluation Group (2018) op. cit.
- 60 World Bank (2014) '[Agribusiness Indicators: Synthesis Report](#)' op. cit.
- 61 World Bank (n.d.) Development Policy Actions Database. [Periodically updated database](#) (accessed 30.3.23). FY22 prior actions database
- 62 Independent Evaluation Group (2018) op. cit.
- 63 World Bank (n.d.) Development Policy Actions Database, op. cit.
- 64 Mousseau F and Currier A (2020) '[World Bank's COVID-19 Assistance to Kenya Benefits Multinational Agribusiness and Agrochemical Firms](#)', Oakland Institute (accessed 30.3.23)
- 65 Cook S, Henderson C, Kharel M, Begum A et al (2016) '[Collaborative action on soil fertility in South Asia: Experiences from Bangladesh and Nepal](#)', IIED Working Paper, London, IIED. (accessed 30.3.23)
- 66 The Economist (2018) '[Africa needs a green revolution](#)' (accessed 30.3.23)
- 67 Jayne T, Mason N, Burke, W and Ariga J (2018) op. cit.
- 68 Independent Evaluation Group (2015) '[Implementation Completion Report \(ICR\) Review – Nigeria](#)' Agricultural Transformation DPO (P130012) (accessed 30.3.23)
- 69 Institute for Agriculture and Trade Policy (2022) '[Alliance for a Green Revolution in Africa still failing Africa's farmers](#)', IATP media release. (accessed 30.3.23)
- 70 Independent Evaluation Group (2015) op. cit.
- 71 World Bank, FAO, IFAD (2009) *Gender in Agriculture Sourcebook*. Washington DC, IBRD/ World Bank. (accessed 13.4.23)
- 72 Ngoma H, Machina H, Kuteya A (2019) 'Can agricultural subsidies reduce gendered productivity gaps? Panel data evidence from Zambia' in *Development Policy Review*, vol 39, issue 2, pp303-323.
- 73 UPOV (n.d.) '[What are the conditions for obtaining protection](#)' (accessed 30.3.23)
- 74 Thomson Reuters (2023) '[Glossary: Plant breeder's rights](#)' in *Practical Law*. (accessed 30.3.23)
- 75 UPOV (2011) '[Welcome](#)' (accessed 13.4.23)
- 76 UPOV 2017 UPOV (2022) '[Overview of UPOV](#)' (accessed 13.4.23)
- 77 UPOV 2017 UPOV (2022) op. cit.
- 78 USDA Economic Research Service (2022) '[Recent trends in GE adoption](#)' (accessed 30.3.23) shows that acreage of GM soybeans in USA plateaued in 2014 (at 95 per cent).
- 79 GRAIN (2015) '[Seed laws that criminalise farmers: resistance and fightback](#)', (accessed 30.3.23)
- 80 World Bank (n.d.) Development Policy Actions Database, op. cit.
- 81 Jaffee S and Srivastava J (1992) '[Seed System Development: the appropriate roles of the private and public sectors](#)', World Bank Discussion Paper 167, Washington DC, World Bank. (accessed 30.3.23)
- 82 World Bank (2014) '[Agribusiness Indicators: Synthesis Report](#)' op. cit.
- 83 World Bank (2014) op. cit.
- 84 FAOSTAT (2022) *Suite of Food Security Indicators* (accessed 30.3.23)
- 85 Independent Evaluation Group (2015) '[Implementation Completion Report \(ICR\) Review – Nigeria](#)' Agricultural Transformation DPO (P130012) op. cit.
- 86 Independent Evaluation Group (2018) '[Implementation Completion Report \(ICR\) Review – Malawi Agri Support and Fiscal Management DPO](#)' (P153753) op. cit.
- 87 Independent Evaluation Group (2019) '[Implementation Completion Report \(ICR\) Review – Mali](#)' in Poverty DPO Series (P157900) (accessed 30.3.23)
- 88 World Bank (2021) '[World Bank Group to Discontinue Doing Business Report](#)' World Bank statement (accessed 30.3.23)
- 89 World Bank Group (2016) *Enabling the Business of Agriculture 2016: comparing regulatory good practices*, Washington DC, World Bank (accessed 30.3.23)
- 90 The Oakland Institute (2017) *Down on the seed: the World Bank enables corporate takeover of seeds* (accessed 30.3.23)
- 91 Oakland Institute (2017) op. cit.
- 92 Blair R, Kimbugwe K, Koleros A, Mangheni M et al (2021) '[Partnership for Inclusive Agricultural Transformation in Africa, Final Evaluation](#)', Washington, Mathematica. (accessed 30.3.23)
- 93 Wise T (2020) *Failing Africa's Farmers: An Impact Assessment of the Alliance for a Green Revolution in Africa*, Medford MA, Global Development and Environment Institute, Tufts University, (accessed 30.3.23)
- 94 Wise T (2020) op. cit.
- 95 Blair R, Kimbugwe K, Koleros A, Mangheni M et al (2021) op. cit. pp 40-4

- 96 Wise T (2022) 'Donor-funded evaluation shows "AGRA did not meet its headline goal" to reduce hunger', IATP (accessed 30.3.23)
- 97 FCDO (2022) 'Development Tracker: Africa food trade and resilience programme' (accessed 30.3.23)
- 98 AFSA (2021) '200 organisations urge donors to scrap AGRA' in AFSA press releases (accessed 30.3.23)
- 99 African Centre for Biodiversity (2015) *The expansion of the commercial seed sector in sub-Saharan Africa: major players, key issues and trends*, Johannesburg, ACB (accessed 30.3.23)
- 100 TANGO International (2020) *Seed sector development for South Sudan (SSD4SS) Project: End of programme evaluation*, AGRA and Kingdom of the Netherlands (accessed 30.3.23)
- 101 Ashton G (2013) 'Is Africa about to lose the right to her seed?' GRAIN blog (accessed 30.3.23)
- 102 Mahapatra R, Pandey K (2022) 'Why are governments across Africa on a legislation spree to regulate seeds market' in Down to Earth (accessed 30.3.23)
- 103 Ghana: Addison M, Ohene-Yankyer K, Acheampong P et al (2022) 'The impact of uptake of selected agricultural technologies on rice farmers' income distribution in Ghana' in Agriculture and Food Security vol.11, issue 2
- Ethiopia: Ahmed M H (2022) 'Impact of improved seed and inorganic fertilizer on maize yield and welfare: Evidence from Eastern Ethiopia' in Journal of Agriculture and Food Research, 7; Van Dijk M, Morley T, van Loon M, Reidsma P, et al (2020) 'Reducing the maize yield gap in Ethiopia: Decomposition and policy simulation' in Agricultural Systems, 183, 102828; Spielman D J, Byerlee D, Alemu D, Kelemework D (2010) 'Policies to promote cereal intensification in Ethiopia: The search for appropriate public and private roles' in Food policy, 35(3), pp. 185-194.
- Mozambique: Chilundo M, De Sousa W, Christen E W, Faduco J, et al (2020) 'Do agricultural innovation platforms and soil moisture and nutrient monitoring tools improve the production and livelihood of smallholder irrigators in Mozambique?' in International Journal of Water Resources Development, 36(sup1), S127-S147; Deininger K, and Xia F (2016) 'Quantifying spillover effects from large land-based investment: The case of Mozambique' in World Development, 87, pp. 227-241.
- 104 Ghana: Madin M B (2022) 'The political ecology of seed security in the Northern Ghanaian Savannahs' in GeoJournal, 87(3) pp.1811-1829; Dokyi E, Anang B T, Owusu V (2021) 'Impacts of Improved Seed Maize Technology Adoption on Productivity and Technical Efficiency in Northern Ghana' in Open Economics, 4(1) pp. 118-132; Tanko M, Ismaila S, Sadiq S A (2019) 'Planting for Food and Jobs (PFJ): A panacea for productivity and welfare of rice farmers in Northern Ghana' in Cogent Economics and Finance, 7(1) pp. 1693121.
- Ethiopia: Ahmed M H (2022) op. cit.; Legesse E E, Srivastava A K, Kuhn A, Gaiser T (2019) 'Household welfare implications of better fertilizer access and lower use inefficiency: long-term scenarios for Ethiopia' in Sustainability, 11(14), pp. 3952; Zerfu D and Larson D F (2010) 'Incomplete markets and fertilizer use: evidence from Ethiopia' in World Bank Policy Research Working Paper (5235).
- Mozambique: Kodama W, Pede V O, Mishr, A K, Cuevas R P O, Ndayiragije A et al (2022) 'Assessing the benefits of green super rice in Sub-Saharan Africa: Evidence from Mozambique' in Q Open, 2(1); Da Encarnação Tomo, M, and Zwane E (2020) 'Assessment of factors influencing the adoption of improved crop management practices (icmp) by smallholder farmers in the Boane District, Mozambique' in South African Journal of Agricultural Extension, 48(1) pp. 99-111; Ponguane S and Mucavele N (2018) 'Determinants of Agricultural Technology Adoption in Chókwe District, Mozambique', MPRA Paper no. 86284
- 105 Maredia M K, Shupp R, Opoku E, Mishili F et al (2019) 'Farmer perception and valuation of seed quality: Evidence from bean and cowpea seed auctions in Tanzania and Ghana' in Agricultural Economics, 50(4) pp. 495-507.
- 106 Arora A, Bansal S, Ward P S (2019) 'Do farmers value rice varieties tolerant to droughts and floods? Evidence from a discrete choice experiment in Odisha, India' in Water resources and economics, 25 pp. 27-41.
- 107 Keyser J (2013) 'Opening up the markets for seed trade in Africa', Africa Trade Practice Working Paper Series, no. 2, Washington DC, World Bank (accessed 30.3.23)
- 108 AGRA (2022) *AGRA Independent Evaluation Management Response*, AGRA
- 109 Baffes J, and Koh W C (2022) 'Fertiliser prices expected to remain higher for longer' in World Bank blogs (accessed 30.3.23)
- 110 World Bank (2022) *Food Security Update*, Washington DC, IBRD/World Bank (accessed 30.3.23)
- 111 Malpass D (2022) 'A transformed fertilizer market is needed in response to the food crisis in Africa' in World Bank blogs (accessed 30.3.23)
- 112 Cook S, Henderson C, Kharel M, Begum A et al (2016) op. cit., p.8
- 113 Carbon Brief (2022) 'Q&A: What does the world's reliance on fertilisers mean for climate change?' in Food and Farming (accessed 30.3.23)
- 114 Menegat S, Ledo A, Tirado R (2022) 'Greenhouse gas emissions from global production and use of nitrogen synthetic fertilisers in agriculture' in Scientific Reports, 12(1) pp.14490
- 115 World Bank (2011) 'Program document for a proposed credit to Republic of Ghana for a third Agriculture Development Policy Operation', World Bank (accessed 30.3.23)
- 116 Mensah A, Asiamah M, Wongnaa C A, Adams F et al (2021) 'Adoption impact of maize seed technology on farm profitability: evidence from Ghana' in Journal of Agribusiness in Developing and Emerging Economies; Etwire E, Ariyawardana A, Mortlock M Y (2016) 'Seed delivery systems and farm characteristics influencing the improved seed uptake by smallholders in Northern Ghana' in Sustainable Agriculture Research, 5(526-2016-37879); Aidoo R, Mensah J O B, Omono F, and Abankwah V (2014) 'Factors determining the use of certified maize seeds by farmers in Ejura-Sekyedumasi Municipality in Ghana' in World Journal of Agricultural Sciences, 2(5).
- 117 Cavane E and Donovan C (2011) 'Determinants of adoption of improved maize varieties and chemical fertilizers in Mozambique' in Journal of International Agricultural and Extension Education, 18(3) pp. 5-21; Carter M R, Laajaj R and Yang D (2013) 'The impact of voucher coupons on the uptake of fertilizer and improved seeds: Evidence from a randomized trial in Mozambique' in American Journal of Agricultural Economics, 95(5) pp. 1345-1351; Carter M, Laajaj R and Yang D (2021) 'Subsidies and the African green revolution: Direct effects and social network spillovers of randomized input subsidies in Mozambique' in American Economic Journal: Applied Economics, 13(2) pp. 206-229.
- 118 FIAN International (2022) 'Benin: rural communities recover peasant seeds to improve nutrition and livelihoods' in News (accessed 30.3.23)
- 119 Wise T (2020) *Failing Africa's Farmers: An Impact Assessment of the Alliance for a Green Revolution in Africa*
- 120 Puskur R, Mudege N N, Njuguna-Mungai E, Nchanji E et al (2021) 'Moving Beyond Reaching Women in Seed Systems Development' in Advancing Gender Equality through Agricultural and Environmental Research: Past, Present, and Future pp. 113-145, Washington DC, IFPRI.

- 121 FAO (2016) *Seed security assessment: a practitioner's guide*, Rome, FAO (accessed 30.3.23)
- 122 Kramer B, and Galiè A (2020) 'Gender dynamics in seed systems development', *PIM Synthesis Brief November 2020* Washington DC, International Food Policy Research Institute (IFPRI).
- 123 Adam R and Muindi P (2019) *Gender Dynamics in Seed Systems in Sub-Saharan Africa and Worldwide Lessons Workshop: Report of Proceedings of the Multi-stakeholder Technical Workshop*, Mexico, CIMMYT (accessed 30.3.23)
- 124 Galiè A (2013) 'Governance of seed and food security through participatory plant breeding: Empirical evidence and gender analysis from Syria' in *Natural Resources Forum* vol 37 No. 1 pp. 31-42
- 125 Njuguna-Mungai E, Omondi I, Galiè A, Jumba H et al (2022) 'Gender dynamics around introduction of improved forages in Kenya and Ethiopia' in *Agronomy Journal*, 114(1) pp. 277-295.
- 126 Stewart Z P, Pierzynski G M, Middendorf B J, Prasad P V (2020) 'Approaches to improve soil fertility in sub-Saharan Africa' in *Journal of Experimental Botany*, 71(2) pp. 632-641; Tully K L, Hickman J, McKenna M, Neill C et al (2016) 'Effects of fertilizer on inorganic soil N in East Africa maize systems: vertical distributions and temporal dynamics' in *Ecological Applications*, 26(6) pp. 1907-1919.
- 127 Pahalvi H N, Rafiya L, Rashid S, Nisar B et al (2021) 'Chemical fertilizers and their impact on soil health in Microbiota and Biofertilizers, Vol 2: Ecofriendly Tools for Reclamation of Degraded Soil Environs pp. 1-20.
- 128 Lal R and Stewart B A (Eds.) (2019) *Soil degradation and restoration in Africa*. CRC Press; Shanka D, (2020) 'Roles of eco-friendly low input technologies in crop production in sub-Saharan Africa' in *Cogent Food and Agriculture*, 6(1), 1843882; Semu E, Tindwa H and Singh B R (2019) 'Heavy metals and organopesticides: Ecotoxicology, health effects and mitigation options with emphasis on Sub-Saharan Africa' in *J. Toxicol. Curr. Res*, 3(010); Wood S A, Bradford M A, Gilbert J A, McGuire K L et al (2015) 'Agricultural intensification and the functional capacity of soil microbes on smallholder African farms' in *Journal of Applied Ecology*, 52(3) pp. 744-752.
- 129 Ofori S A, Cobbina S J, Obiri S (2021) 'Climate change, land, water, and food security: Perspectives From Sub-Saharan Africa' in *Frontiers in Sustainable Food Systems*, 5, 680924; Akinyi D P, Karanja Ng'ang'a S, Girvetz E H (2021) 'Trade-offs and synergies of climate change adaptation strategies among smallholder farmers in sub-Saharan Africa: A systematic review' in *Regional Sustainability*, 2(2) pp. 130-143; Pan Africa Chemistry Network (2010) *Africa's water quality: a chemical science perspective*, London, Royal Society of Chemistry and Syngenta.
- 130 Tully K L, Sullivan C, Weil R, Sanchez P (2015) 'The state of soil degradation in Sub-Saharan Africa: Baselines, trajectories, and solutions' in *Sustainability*, 7(6) pp. 6523-6552.
- 131 Debele R D (2021) 'The Effect of Integrated Organic and Inorganic Fertilizer on Soil Fertility and Productivity' in *Journal of Ecology & Natural Resources*, 5(3) 000248.
- 132 Raimi A, Adeleke R, Roopnarain A (2017) 'Soil fertility challenges and Biofertiliser as a viable alternative for increasing smallholder farmer crop productivity in sub-Saharan Africa' in *Cogent Food & Agriculture*, 3(1), 1400933.
- 133 Tully K L, Wood, S A, Almaraz M, Neill C, Palm C (2015) 'The effect of mineral and organic nutrient input on yields and nitrogen balances in western Kenya' in *Agriculture, Ecosystems & Environment*, 214, pp. 10-20.
- 134 Pingali P L (2012) 'Green revolution: impacts, limits, and the path ahead' in *Proceedings of the national academy of sciences*, 109(31) pp. 12302-12308.
- 135 West African Farmers' Seed Committee (2022) *Declaration* (accessed 30.3.23)
- 136 Sarkar S, Gil J D B, Keeley J, Jansen, K (2021) 'The use of pesticides in developing countries and their impact on health and the right to food' European Union (accessed 30.3.23)
- 137 Sarker S et al (2021) op. cit.
- 138 Michelson H, Gourlay S, Wollburg P (2022) 'Non-Labor Input Quality and Small Farms in Sub-Saharan Africa'. Policy Research Working Paper 10092, Washington DC, World Bank (accessed 30.3.23)
- 139 Pan Africa Chemistry Network (2010) op. cit.
- 140 Richie H (2021) 'Excess fertilizer use: Which countries cause environmental damage by overapplying fertilizers?' in *Our World in Data* (accessed 30.3.23)
- 141 Collins S (2023) 'Carbon emissions from fertilisers could be reduced by as much as 80% by 2050' in *Cambridge University research news* (accessed 30.3.23)
- 142 Namatovu R (2019) 'Improving women farmers' access to quality seeds in Uganda' in *AFSA Case Studies* (accessed 30.3.23)
- 143 FAO (2022) 'Options for encouraging, guiding and promoting the realization of Farmers' Rights as set out in Article 9 of the International Treaty', IT/GB-9/22/13.3, Rome, FAO (accessed 30.3.23)
- 144 Andersen R (2020) *What are Farmers' Rights?* (accessed 30.3.23)
- 145 Andersen R (2020) op. cit.
- 146 International Treaty on Plant Genetic Resources for Food and Agriculture (2002) UK government website (accessed 30.3.23)
- 147 FAO (2022) op. cit.
- 148 Shashikant S (2019) 'Implementing Sui Generis Plant Variety Protection System that Recognizes Farmers' Seed Systems, Farmers' Varieties and Advances Farmers' Rights' in *The Inventory*, FAO (accessed 30.3.23)
- 149 Brazil Ministry of Agrarian Development / Ministry of Agriculture (2019) 'Recognition of farmers' varieties/ landraces and voluntary registration' in *The Inventory*, FAO (accessed 30.3.23); Brazil – Secretaria de Agricultura Familiar e Cooperativismo, Embrapa, National Crop Agency (CONAB) (2021) 'Implementation of farmers' rights through the recognition of farmer seed/populations and provisions made for a discreet farmer seed system registration process, not linked to commercial seed and crop value chains' in *The Inventory*, FAO (accessed 30.3.23)
- 150 State of Bolivia (2019) 'Farmers' Rights of the Nations and Rural Native Indigenous Peoples' in *The Inventory*, FAO (accessed 30.3.23)
- 151 African Centre for Biodiversity (2020) 'Venezuelan Seed Law No. 6.207 of 2015' in *The Inventory*, FAO (accessed 30.3.23)
- 152 Philippines (2019) 'IPOPPh-NCIP Joint Administrative Order No. 01-2016 (Rules and Regulations on Intellectual Property Rights Application and Registration Protecting the Indigenous Knowledge Systems and Practices of Indigenous Peoples (IPs) and Indigenous Cultural Communities (ICCs)' 2015' in *The Inventory*, FAO (accessed 30.3.23)
- 153 African Centre for Biodiversity (2019) 'Exemptions or flexibilities in seed registration for farmers' varieties' in *The Inventory*, FAO. <https://www.fao.org/plant-treaty/areas-of-work/farmers-rights/inventory-on-frs/news-detail/en/c/810699/> (accessed 30.3.23)

- 154 African Centre for Biodiversity (2021) [‘Ethiopian Seed Law Proclamation No. 782/2013’](#) in The Inventory, FAO (accessed 30.3.23); APBEBES (2019) [‘Recognizing Farmer’s Rights to freely save, use, exchange and sell farm-saved seed/ propagating material protected varieties in Plant Variety Protection laws’](#) in The Inventory, FAO (accessed 30.3.23)
- 155 Batten L, Plana Casado M J, van Zeven J (2021) ‘Decoding seed quality: a comparative analysis of seed marketing law in the EU and the United States’ in *Agronomy*, 11(10), 2038.
- 156 UPOV (2017) *Overview of UPOV*.
- 157 Dutfield G (2011) [‘Food, biological diversity and intellectual property: The role of the International Union for the Protection of New Varieties of Plants \(UPOV\)’](#) in Global Economic Issue Publications, Geneva, Quaker United Nations Office (accessed 30.3.23)
- 158 Herpers S, Vodouhe R, Halewood M, De Jonge B (n.d.) [‘The support for farmer-led seed systems in African seed laws’](#) in ISSD Africa Synthesis Paper, ISSD (accessed 30.3.23)
- 159 Louwaars N (2007) *Seeds of confusion: The impact of policies on seed systems* The Netherlands, Wageningen University (accessed 30.3.23)
- 160 Public Citizen (n.d.) [‘The differences between Plant Variety Protection and Patent Protection on plants’](#) (accessed 30.3.23)
- 161 African Centre for Biodiversity (2017) [‘Concerns with the Revised Plant Breeders’ Rights Act, Johannesburg, ACB’](#) (accessed 30.3.23)
- 162 Visser B (2017) [‘The impact of national seed laws on the functioning of small-scale seed systems: a country case study, The Hague, Oxfam Novib’](#) (accessed 30.3.23)
- 163 Republic of Ghana (2020) [‘Plant Variety Act 2020’](#) (accessed 30.3.23)
- 164 FIAN International (2022) [‘Food Sovereignty Ghana fights for right to seeds’](#) in FIAN News (accessed 30.3.23)
- 165 Dena H (2022) [‘Punitive seed laws protect big corporations over Kenya’s farmers’](#) in Greenpeace press release (accessed 30.3.23); Dena H (2022) [‘Africa: farmers file a court case to stop punitive seed laws’](#) in allAfrica (accessed 30.3.23)
- 166 Kenyan government (2012) [‘Seeds and Plant Varieties Act. Act No. CAP 326’](#) (accessed 30.3.23)
- 167 Kuhlmann K and Dey B (2021) ‘Using regulatory flexibility to address market informality in seed systems: A global study’ in *Agronomy*, 11(2) pp. 377.
- 168 FAO Commission on genetic resources for food and agriculture (2021) [‘Impact of implementation of seed legislation on diversity of plant genetic resources for food and agriculture’](#). CGRFA/WG-PGR-10/21/3 Inf.1, Rome, FAO
- 169 Adebola T (2019) ‘Access and benefit sharing, farmers’ rights and plant breeders’ rights: reflections on the African Model Law’ in *Queen Mary Journal of Intellectual Property*, 9(1), pp. 105-121.
- 170 Golay C (2017) [‘The right to seeds and intellectual property rights’](#) Research Brief, Geneva Academy of International Humanitarian Law and Human Rights (accessed 30.3.23)
- 171 GRAIN (2001) [‘IPR agents try to derail OAU process: UPOV and WIPO attack Africa’](#) Model Law on community rights to biodiversity. (accessed 30.3.23)
- 172 Seeds4all (n.d.) [‘EU organic legislation post-2022’](#) (accessed 30.3.23)
- 173 García López V, Giraldo O F, Morales H, Rosset P M et al (2019) ‘Seed sovereignty and agroecological scaling: Two cases of seed recovery, conservation, and defense in Colombia’ in *Agroecology and Sustainable Food Systems*, 43(7-8), 827-847.
- 174 Peschard K and Randeria S (2020) ‘Keeping seeds in our hands: the rise of seed activism’ in *The Journal of Peasant Studies*, 47(4) pp. 613-647.
- 175 García López V et al (2019) op. cit.
- 176 ETC Group (2013) [‘Gene Giants seek “Philanthropopoly”’](#) in ETC Group Communiqué Issue 110 (accessed 30.3.23)
- 177 Meek A (2006) [‘Down and out in Covington’](#) in *The Daily News*, Memphis, vol 121, no. 128, Memphis (accessed 30.3.23)
- 178 Indigenous Peoples Major Group for Sustainable Development (n.d.) [‘New law and trade agreement will diminish farmers’ control over seeds.’](#) (accessed 30.3.23)
- 179 Schauenberg T (2019) [‘Patents on plants threaten farmers’](#) in *Nature and Environment*, Deutsche Welle (accessed 30.3.23)
- 180 Potato Business (2021) [‘PepsiCo Lay’s FC5 potato variety patent revoked by India’](#) (accessed 30.3.23)
- 181 Lopes F (2022) [‘Explained: the legal battle over the potatoes used to make Lay’s chips’](#) in *Agriculture and Industry*, IndiaSpend (accessed 30.3.23)
- 182 Oakland Institute (2017) op. cit.
- 183 Gisselquist D and Van Der Meer C (2001) [‘Regulations for seed and fertilizer markets: a good practice guide for policy makers’](#), Rural Development Working Paper (accessed 30.3.23)
- 184 Gaia Foundation (2013) [‘African Civil Society Organisations to counter corporatisation of African agriculture.’](#) (accessed 30.3.23)
- 185 International Treaty on Plant Genetic Resources for Food and Agriculture (n.d.) [‘Inventory’](#) (accessed 30.3.23)
- 186 Visser B (2017) op. cit.
- 187 The Oakland Institute (2017) op. cit.
- 188 IPES-Food (2020) [‘The added value\(s\) of agroecology: unlocking the potential for transition in West Africa.’](#) (accessed 30.3.23)
- 189 Schader C, Heidenreich A, Kadzere I, Egyir I et al (2021) [‘How is organic farming performing agronomically and economically in sub-Saharan Africa?’](#) in *Global Environmental Change*, vol 70 (accessed 30.3.23)
- 190 Pretty J, Noble A, Bossio D, Dixon J et al (2006) [‘Resource-conserving agriculture increases yields in developing countries’](#) in *Environmental Science and Technology* vol 40/4 pp1114-1119 (accessed 30.3.23)
- 191 Wise T, Belay M (2021) [‘Time to transition to agroecology in Africa’](#), IATP blog (accessed 30.3.23)
- 192 Reij C, Tappan G, Smale M (2009) [‘Agroenvironmental transformation in the Sahel: another kind of “Green Revolution”’](#), IFPRI Discussion Paper 00914 (accessed 30.3.23)
- 193 Galab S, Bhaskara Rao G, Sree Rama Raju D, Prudhvikar Reddy P et al (2022) [‘Assessing the impact of APCNF’](#), Institute for Development Studies Andhra Pradesh (accessed 30.3.23)
- 194 Leippert F, Darmaun M, Bernoux M, Mpheshea M (2020) [‘The potential of agroecology to build climate-resilient livelihoods and food systems’](#), Rome, FAO and Biovision (accessed 30.3.23)
- 195 Snapp S, Kebede Y, Wollenberg E, Dittmer K et al (2021) [‘Agroecology and climate change rapid evidence review: performance of agroecological approaches in low- and middle- income countries’](#), Wageningen, CGIAR CCAFS.

- 196** Mdee A, Wostry A, Coulson A, Maro J (2018) 'A pathway to inclusive sustainable intensification in agriculture? Assessing evidence on the application of agroecology in Tanzania' in *Agroecology and Sustainable Food Systems*, vol 43, issue 2, pp 201-227.
- 197** UNEP and UNCTAD (2008) *Organic Agriculture and Food Security in Africa*, New York, United Nations (accessed 30.3.23)
- 198** FAO (2023) 'The 10 elements of agroecology: guiding the transition to sustainable food and agriculture', Rome, FAO (accessed 13.4.23).
- 199** FAO (2023) op. cit.
- 200** FAO (2022) op. cit.