



# Agriculture

Access to technology and finance can change agriculture in Africa

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Chart 3 forecasts Africa's steady increase in total agriculture production to 2043. However, because of its rapid population growth, agricultural production per capita will slowly decline by 2043. This is in contrast to China's yields, which continue to rise while South America sustains higher production after an impressive decade-long sprint to improve productivity. Africa is condemned to food insecurity and expensive agricultural imports without an agricultural revolution.

Agricultural technologies ([AgTech](#)) can help farmers overcome market barriers and enhance [agricultural productivity](#) and sustainability. AgTech can improve access to financial services, inputs (such as seeds, fertilisers, and agrochemicals), markets, and information, as well as give access to shared assets such as tractors. It can reduce input costs associated with herbicides, pesticides and fertilisers through greater application precision and [smart sensors](#). In its 2019 report on the state of climatic conditions in Africa, for example, the [World Meteorological Association](#) notes that solar-powered micro-irrigation has the potential not only to offset carbon emissions but also to increase farm-level incomes five to ten times, improve yields by up to 300% and reduce water usage by up to 90%.

The last decade has seen many innovations in [agricultural technologies](#). The proliferation of mobile phones and the growing availability of connectivity can allow companies to offer credit to unbanked smallholder farmers and insurance to safeguard their livelihoods. It can provide these farmers with direct market access, information about weather events, advice, crop monitoring, and access to shared assets through equipment rentals for tractors and other mechanised farming equipment. African farmers have fewer than two tractors per thousand hectares of cropland, compared to an average of ten tractors in South Asia and South America. The mobile platform Hello Tractor connects tractor owners and operators with farmers needing tractor services to make tractor ownership more profitable and tractor use more affordable.

Real-time data can allow farmers to adapt farming practices to changing weather conditions while monitoring soils can help farmers make informed decisions about irrigation and fertiliser use. The global phosphate and fertiliser giant OCP, majority owned by the Moroccan state, has partnered with Microsoft to leverage artificial intelligence for its African digital agriculture platform. The partnership uses OCP's data on soil mapping, soil samples, and demonstration trails to customise fertiliser solutions and provide farmers with decision-informing data. Similarly, the US company Atmo employs artificial intelligence in weather forecasting. It has partnered with COMESA to offer governments meteorology and supercomputing technologies to help make informed decisions based on accurate weather prediction. That, in turn, enhances country-level crop insurance, optimises input allocation, and bolsters preparedness for natural disasters. In Kenya, [FarmDrive](#) uses machine learning and various data sources to unlock access to credit for smallholder farmers. Once the exact location of the smallholder farm is confirmed, often concerning a known point such as the location of a nearby primary school, the system accesses geospatial information to determine soil quality, weather conditions and market accessibility. Then, it uses an algorithm to determine a credit score. The associated decision-making tool enables financial institutions to develop small-scale agriculture loan products.

In Ghana, Kenya and Uganda, over 20 000 farmers have access to affordable insurance contracts (such as against crop failure or the loss of expensive breeding stock) via their smartphones, using blockchain technology. The system uses high-resolution satellite images to detect rainfall and plant growth data. It advises what, when and where to plant and directs farmers to suitable packaging and distribution centres.<sup>[1]</sup>

Applications such as [DigiFarm](#) in Kenya help farmers access low-cost seed and fertiliser, loans, insurance and bulk purchases.

In Ghana, a voice service and SMS platform, [Farmerline](#), has helped about a million farmers with advice on market prices, financial tips and weather forecasts.

Over the last decade, the [Alliance for a Green Revolution in Africa \(AGRA\)](#) has invested hundreds of millions of dollars in improved seeds. It has doubled maize yields in the 18 countries where it works (although detractors oppose these Green Revolution programmes and call them efforts to [promote industrial agriculture](#)).

These examples reflect some of the many emerging African solutions that can help the continent's estimated 50 million smallholder farmers change a traditional farming mindset to one focused on practising agriculture as a business. However, a lack of access to electricity in rural areas and low Internet penetration are significant obstacles to applying modern technology in agriculture (see the theme on [Leapfrogging](#)).

Improving soil fertility is another critical aspect of improved agricultural production. The use of organic or human-made fertilisers has significantly boosted yields. Usage in [Africa](#) is generally lower than elsewhere in the world despite the soil being poorer than in most other continents. Sub-Saharan Africa has shallow [fertiliser use](#) of 22 kg per hectare, whereas the world average is 146 kg per hectare. Countries such as China are closer to 400 kilograms per hectare.

With the limited use of [fertiliser](#), soil fertility depletion generally continues unabated. The challenge is that the manufacturing and application of fertilisers (generally in the form of ammonia as a nitrogen supplement) have a heavy carbon emissions toll. Africa produces approximately 30 million metric tons of fertiliser annually, twice as much as it consumes. Yet approximately 90% of [fertiliser](#) consumed in sub-Saharan Africa is imported, primarily from outside the continent and at enormous cost. The low domestic fertiliser use in Africa is due to prices being far higher than elsewhere. Although the delivery cost at the port is similar to that for other importing countries, the cost of distribution in Africa is higher, reflecting the continent's poor transport infrastructure, the lack of competition and inappropriate regulations.

Despite a strong lobby against more intensive fertiliser use, various efforts are underway to increase the production, access, affordability and appropriate use of fertilisers on the continent.

- The [Africa Fertilizer Financing Mechanisms \(AFFM\)](#) supports improving smallholders' access to fertiliser. The African Development Bank [reports](#) that by the end of 2022, 97 small and medium enterprises gained access to finance, 138 fertiliser suppliers and just shy of 21 000 smallholder farmers benefited from capacity-building through the AFFM.
- The Indorama Eleme public-private [fertiliser plant](#), completed in 2016, advertises itself as the largest single-line fertiliser plant in the world and was built to turn Nigeria from a large fertiliser importer to a self-sufficient producer and eventually a net exporter. In 2017, Nigeria exported 700 000 metric tons of urea fertiliser. The plant produces 1.5 million metric tons annually, of which 40% are used in the [Nigerian farming sector](#).
- Morocco's OCP Group, which holds 75% of the world's phosphate reserves (an essential ingredient for phosphate-based [fertilisers](#)), signed an agreement in 2021 that will see the actualisation of a US\$1.5 billion plant with an estimated operational starting date in 2025.
- At the [African Union \(AU\) Fertilizer & Soil Health Summit](#) in Nairobi on 7-9 May 2024, African leaders unveiled the new [10-year Fertilizer and Soil Health Action Plan 2023-2033](#). Designed to maintain soil fertility and ensure soil health across the continent, the roadmap adopts an approach that combines both chemical and organic fertilisers with improved seeds and agrochemicals. The plan aims to 'significantly increase investments in the local manufacturing and distribution of mineral and organic fertilisers, bio fertilisers and biostimulants' and 'triple fertiliser use from 18 kg/ha in 2020 nutrients to 54 kg/ha in 2033'.

## Endnotes

1. In most of rural Africa, the precise location of a farm is objectively unknown so the location is determined via a series of SMS questions (e.g. time to walk to different primary schools). The more schools a farmer is familiar with in their area, the easier it is to hone in on their specific location.

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## About the authors

Ms Alize le Roux joined the AFI in May 2021 as a senior researcher. Before joining the ISS, she worked as a principal geo-informatics researcher at the CSIR, supporting various local and national policy- and decision-makers with long-term planning support. Alize has 14 years of experience in spatial data analysis, disaster risk reduction and urban and regional modelling. She has a master's degree in geographical sciences from the University of Utrecht, specialising in multi-hazard risk assessments and spatial decision support systems.

Dr Jakkie Cilliers is the ISS's founder and former executive director. He currently serves as chair of the ISS Board of Trustees, head of the African Futures and Innovation (AFI) programme at the Pretoria office of the Institute, and is an extraordinary professor at the University of Pretoria. His 2017 best-seller *Fate of the Nation* addresses South Africa's futures from political, economic and social perspectives. His three most recent books, *Africa First! Igniting a Growth Revolution* (March 2020), *The Future of Africa: Challenges and Opportunities* (April 2021), and *Africa Tomorrow: Pathways to Prosperity* (June 2022) take a rigorous look at the continent as a whole.

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