United Nations
Economic Commission for Africa

North African solutions to the food crisis in Africa: the role of fertilizers and supportive policies

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Contents

Foreword

The combined effects of the coronavirus disease (COVID-19) pandemic, climate change, the war in Ukraine and disruptions to trade have heightened food insecurity in Africa. Elevated and volatile food prices have pushed vulnerable populations into extreme poverty, exacerbating hunger and malnutrition, and jeopardizing progress towards the achievement of the Sustainable Development Goals, in particular Goal 1 (no poverty), Goal 2 (zero hunger) and other Goals affected by spillover. Despite recent reductions in food prices, food security on the continent remains elusive. Although the potential of agricultural production is high, Africa has been producing less food than it needs, which means that the issues of African food sovereignty and greater agricultural productivity are back on the policy agenda.

Against that backdrop, North Africa, with its rich mineral endowments, can play an important role in supporting the efforts of the other subregions on the continent to boost domestic food production by easing access to affordable fertilizer at scale. In the context of the ongoing implementation of the Agreement Establishing the African Continental Free Trade Area, the abundance of phosphates provides an opportunity for North Africa to strengthen integrated productive capacities in relation to fertilizer and help Africa to feed itself.

To achieve that objective, members of the Economic Commission for Africa (ECA) must devise and implement policies with a dual approach: short-term policies, to mitigate the immediate impact of the crisis on food and fertilizer prices, and long-term strategies, to ensure that Africa is resilient to future crises and self-sufficient with regard to food. Regional integration, in the form of the effective implementation of the Agreement Establishing the African Continental Free Trade Area, can be used by North Africa to help the continent to overcome the current situation.

In support of the action of members of ECA to establish an integrated and efficient market in Africa, the Subregional Office for North Africa continues to launch initiatives to build the capacity for formulating regional and national strategies to implement the Agreement. Notable relevant efforts include studies, expert meetings and publications on developing regional value chains, fostering cross-border entrepreneurship, supporting workers' mobility and analysing trade potential.

The present study is an important contribution to those ongoing efforts: it includes an exploration of the potential of an integrated African fertilizer market and the impact that such a market could have on agricultural productivity and food security. Currently, the use of fertilizer on the continent remains at among the lowest levels in the world. The objective highlighted in the study is to increase intra-African trade by proposing a set of sound policy recommendations aimed at improving the production, trade and use of fertilizer across Africa, thus raising the resilience of States in the face of the current multifaceted global food crisis.

Some of the takeaways from the present report include the following recommendations:

(a). Adequate and timely measures should be considered to support improved fertilizer trade within the framework of the Agreement Establishing the African Continental Free Trade Area;

(b). Implementation of the credit guarantee schemes of the Africa Fertilizer Development Financing Mechanism should be scaled up, and access to related services should be widened for small-scale farmers.

As identified in the report, North African States are recommended to:

(a). Develop bilateral and subregional partnerships with import-dependent African States, with the objective of promoting trade and constructing industrial plants for local fertilizer production;

(b). Support the efforts of import-dependent African States with research and development, in particular in relation to soil analysis, fertility maps and biodiversity.

The efficient production of fertilizer and its trade at the continental level will help Africa to feed itself and progress towards the achievement of the Sustainable Development Goals.

Acknowledgements

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Executive summary

Global market disruptions and the lingering effects of the coronavirus disease (COVID-19) pandemic, exacerbated by the war between the Russian Federation and Ukraine and amplified by the growing effects of climate change, are deepening food insecurity in Africa.

International fertilizer prices increased rapidly over 2021 and 2022, reaching a peak in April 2022. Prices were already at a raised level at the end of 2021 because of trade disruptions driven by the COVID-19 pandemic, and the war in Ukraine exacerbated the fragile situation and pushed fertilizer prices to their highest levels in recent years. Although fertilizer prices have since eased slightly, they remain high compared with the average of recent years. Moreover, the global fertilizer market is affected by fertilizer price volatility, which generates uncertainty and impedes the access of farmers, especially smallholders, to the inputs that they require.

Within the context of the elevated and volatile fertilizer prices in the global market, African solutions are needed. Available and affordable fertilizer could help the continent to increase its agricultural productivity, decrease its dependence on food imports, feed its population and improve its food security. North Africa, specifically Algeria, Egypt, Morocco and Tunisia, where phosphate reserves are significant, could play a key role in providing the rest of the continent with the inputs required for Africa to feed itself.

In addition to its potential for the production of nitrogen-based fertilizer, North Africa possesses the most significant reserves of phosphates in the world and has the complementary human, financial and technical resources and the institutional framework that are needed for enhanced and sustainable fertilizer production. The effective implementation of the Agreement Establishing the African Continental Free Trade Area and continent-wide initiatives on the intensified use of fertilizer would move Africa towards achieving an adequate food supply.

North Africa could play a key role in improving the availability and affordability of fertilizer in the continental market. Even if African intraregional trade in phosphatic fertilizer is relatively high, given that almost 60 per cent of phosphatic fertilizer comes from African suppliers, mostly from North Africa, there is room for more integration. That goal could be achieved if major African agricultural producers, such as Kenya, South Africa and the United Republic of Tanzania, shift from their international suppliers to African producers and if the rest of the continent increases the use of fertilizer to comparable levels, in line with the expected population growth on the continent.

If Kenya, South Africa and the United Republic of Tanzania shifted their suppliers from outside to within the continent, the integration rate will increase by an additional 26 per cent.

In addition to the potential for expanding the intra-African trade in phosphatic fertilizer through replacing external suppliers with African producers, especially by importing countries that currently have a relatively high dependency on suppliers outside the continent, an increase of fertilizer use across Africa would provide producers of African phosphatic fertilizer with additional market opportunities.

Fertilizer use in Africa remains among the weakest in the world. The chronic food insecurity of the continent and the need to increase the use of fertilizer to boost agricultural productivity should incentivize policymakers to strengthen regional initiatives and expand the use of fertilizer.

Greater continental integration, driven by the implementation of the Agreement Establishing the African Continental Free Trade Area, could be leveraged to mobilize African solutions to address the chronic food insecurity on the continent, in particular by guaranteeing access to fertilizer. The African Trade Exchange Platform has been established to fulfil that role, and other continental initiatives have been used to improve trade finance.

I. Introduction

Escalating energy prices, disruptions to global supply chains and the crisis in Ukraine have been driving the increase in and volatility of fertilizer prices and jeopardizing future harvests. Together with the impacts of climate change, those trends aggravate the risk that food prices remain higher for longer and jeopardize food security in Africa.

Elevated and volatile food prices are impeding the African efforts to reduce poverty, hunger and malnutrition. In the near term, access to fertilizer for future planting seasons across North Africa is key to containing the effects of the ongoing crises. In the medium term, reliable access to fertilizer is needed to produce more and better-quality food for the growing population of the subregion and to safeguard development gains.

Africa is especially vulnerable to disturbances in the global fertilizer market, given that 31 of the 40 African countries for which data is available depend on imports for 50 per cent or more of their fertilizer use. Countries that rely heavily on fertilizer imports from Belarus and the Russian Federation must find alternative sources in a tight global market.

The trade restrictions adopted by major fertilizer producers, such as China and the Russian Federation, provide North Africa with a market opportunity. The subregion could increase its market share by providing the fertilizer required for current and future seasons across the world. That goal can be achieved if the production capacity of the subregion and the required transport infrastructure are available and flexible enough to respond with agility to the relative increase in the global demand for fertilizer.

The present report includes a proposal for an integrated African fertilizer market, where fertilizer producers need to be strengthened in order to implement the "Feed Africa" strategy of the African Development Bank. The first section of the report concerns recent fertilizer price trends, and the second section includes an assessment of the phosphate resources of North Africa, which can strengthen the role of the subregion in providing more fertilizer to other African countries. Key initiatives for better access to and use of fertilizer on the continent are provided in the third section. The report covers the aspect of sustainability, as well as policy recommendations.

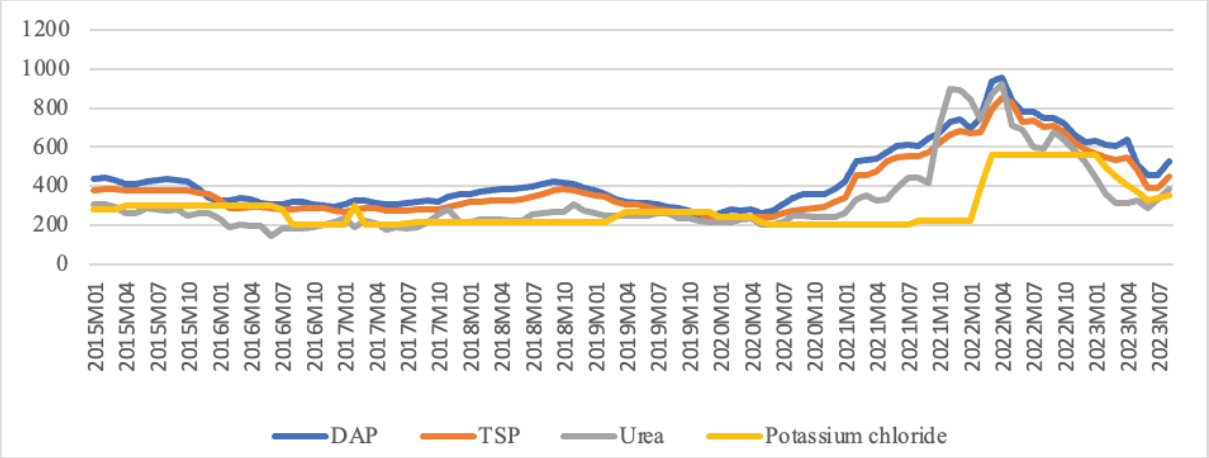
II. Elevated and volatile fertilizer prices heighten food insecurity risks

The present section sets out the recent trends in the global fertilizer market, in particular those regarding prices, and includes an outline of their expected impact on food security in Africa, emphasizing the link between the low use of fertilizer and weak agricultural productivity.

A. Fertilizer prices remain high and uncertain

International fertilizer prices increased rapidly over 2021 and 2022, reaching a peak in April 2022. Prices were already at a raised level at the end of 2021 because of trade disruptions driven by the COVID-19 pandemic, and the war in Ukraine exacerbated the fragile situation and pushed fertilizer prices to their highest levels in recent years. Although fertilizer prices have since eased slightly, they remain high compared with the average of recent years, as is clear from figure I. Moreover, the global fertilizer market is affected by fertilizer price volatility, which generates uncertainty and impedes the access of farmers, especially smallholders, to the inputs that they require.

Figure I: Fertilizer price from January 2015 to August 2023 (United States dollars per ton)



Source: *World Bank (2023c).*

Abbreviations: *DAP, diammonium phosphate; TSP, triple superphosphate.*

A confluence of factors has led to recent developments in fertilizer prices. On the supply side, the most important factor has been the significant increase in the price of natural gas, used as both an input and an energy source in the production of ammonia, which is used for nitrogen fertilizer. In China, the increased price of coal, the main energy source for ammonia production in the country, led fertilizer manufacturing plants to cut production, contributing to the increase in prices.

The impact of the pre-existing supply disruptions on the global fertilizer market caused by the COVID-19 pandemic has been amplified by the sanctions imposed on Belarus and the Russian Federation and the

disruptions on the Black Sea trading routes.[1] Moreover, several countries placed restrictions on fertilizer exports to ensure their domestic availability, which contributed to the rise in international prices. The main export restrictions on fertilizer in 2022 are set out in table 1.

Table 1: Export restrictions on fertilizer during the crisis in Ukraine in 2022

Policy status	Category	Country	Products	Start date	End date	Percentage of global exports of nitrogenous fertilizer affected	Percentage of global exports of potash affected	Percentage of global exports of phosphates affected
Inactive	Ban	Republic of Korea	Fertilizer: urea	11 Nov. 2021	31 Mar. 2022	0.3	–	–
Active	Ban	China	Phosphate rock	28 Sept. 2021	31 Dec. 2022	–	–	0.6
		Kyrgyzstan	Mineral fertilizer	26 Feb. 2022	26 Aug. 2022	–	–	–
		Russian Federation	Fertilizer	2 Feb. 2022	31 Aug. 2022	10.1	18.7	8.6
		Ukraine	Nitrogenous fertilizer (including compound), phosphatic fertilizer, potassic	12 Mar. 2022	31 Dec. 2022	0.9	0.2	–
	Export licensing	China	Fertilizer	24 Sept. 2021	31 Dec. 2022	10.6	1.2	11.4
		Russia	Nitrogenous fertilizer (including compound)	3 Nov. 2021	31 Dec. 2022	10.1	2.8	8.5
	Export taxes	Viet Nam	Mineral fertilizer	6 May 2022	31 Dec. 2022	0.2	0.2	0.3

Source: Laborde (2022).

The immediate concern of policymakers is focused on the impact of high food prices on food security, especially in low-income and middle-income countries. Rising and volatile fertilizer prices, however, and the related availability issues jeopardize future harvests, which risks food prices staying higher for longer, negatively affecting medium-term food security in Africa.

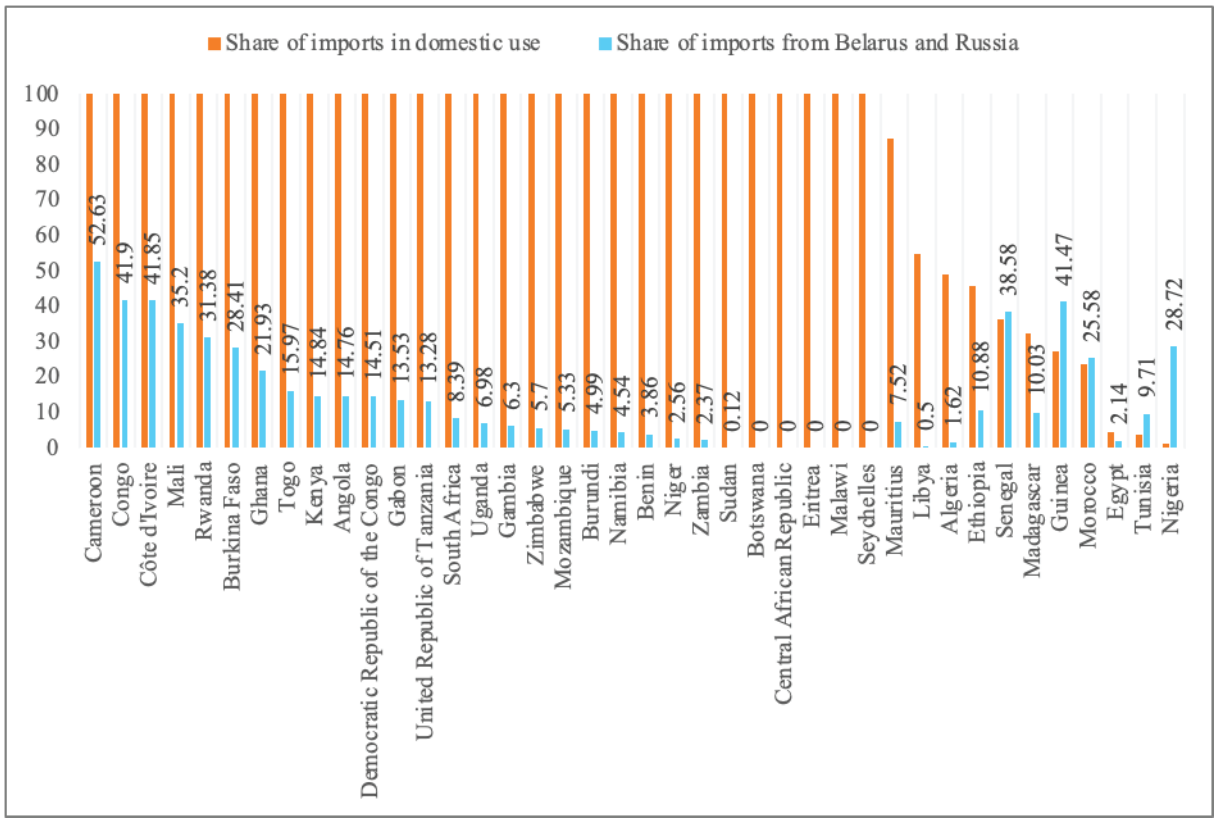
B. Elevated and volatile fertilizer prices jeopardize food security in Africa

Africa is especially vulnerable to disturbances in the global fertilizer market, given that 31 of the 40 African countries for which data is available depend on imports for 50 per cent or more of their fertilizer use. Countries that rely heavily on fertilizer imports from Belarus and the Russian Federation (see figure

1 In 2020, the Russian Federation provided 14 per cent of globally traded urea (the most widely applied nitrogen fertilizer), and 11 per cent of monoammonium phosphate and diammonium phosphate (the most widely applied phosphatic fertilizers). Together, Belarus and the Russian Federation were the source of 41 per cent of all traded muriate of potash (the most widely applied potassium fertilizer) (Hebebrand and Laborde, 2022).

II) must find alternative sources in a tight global market. Even if they succeed in finding alternative suppliers, the greater distances and the rerouting of transport will incur additional costs, further driving up fertilizer prices and reducing availability (Hebebrand and Laborde, 2022).

Figure II: Import share of African countries in domestic fertilizer use and their dependency rate on Belarus and the Russian Federation, 2020 (Percentage)



Source: Author's reconstruction based on Hebebrand and Glauber (2023).

African countries have already felt the immediate impact of higher fertilizer prices. According to the World Food Programme (WFP) (2022), fertilizer prices have more than doubled in Kenya, Uganda and the United Republic of Tanzania during 2022. As a result, and owing to elevated fuel prices, WFP estimates that cereal production in East Africa, which is historically one of the most food-insecure subregions in the world, may have decreased during the 2022 cropping year by 16 per cent year on year. WFP has forecasted that the number of food-insecure people in the subregion would rise by nearly 6 million to 7 million by the end of 2022, solely because of the reduced crop production caused by the fertilizer price increase and the attendant reduction in use. In contrast with those conservative estimates, as characterized by WFP, the actual figures may be higher in some countries that have been affected by the ongoing drought conditions in the subregion.

Given the already inadequate use of fertilizer in Africa, the continent could be particularly affected by the current tensions in the global market, reducing fertilizer use and agricultural productivity even further, which potentially has serious consequences for food security. African countries could be negatively affected in three ways.

First, higher fertilizer prices have directly reduced demand and use. Although some countries, such as Egypt and Ghana, have introduced fertilizer subsidy schemes to cushion the impact of the price shock, such schemes are not sustainable, given that they put additional fiscal pressure on already stretched budgets.

Second, many African countries, which are relatively small markets, may be getting overlooked by producers and traders who are likely to favour shipping the available supplies of fertilizer to larger markets to save on shipping costs (WFP, 2022).

Third, although such countries as Morocco, a major global phosphatic fertilizer producer, could benefit from higher prices and expand their market shares, many African fertilizer manufacturing plants merge imported components to deliver final products. Even if the current delivery disruptions, such as cancellations and delays, affect only a single input, such as potash, an entire value chain could be disrupted, depriving producers and farmers of inputs for weeks or months. Such a structure makes local fertilizer production less lucrative than the simple headline prices indicate.

C. Weak use of fertilizer constrains African agricultural productivity

The agricultural sector remains a crucial source of economic growth and employment and features in poverty reduction policies in most African countries. The increased and improved use of fertilizer is an essential aspect of agricultural transformation and economic development. International experience shows that agricultural transformation and increased productivity is achieved through the more intensive use of agricultural inputs, such as fertilizer, improved seeds, irrigation and mechanization.

Despite the high-level commitment from policymakers at the Africa Fertilizer Summit, held in Abuja in 2006 with the slogan "We must feed our soils to feed our people", Africa is still lagging behind the rest of the world in terms of fertilizer consumption.

The Abuja Declaration on Fertilizer for an African Green Revolution, which was an outcome of the Summit, included a call for an increase in fertilizer use from 8 kg of nitrogen, phosphorus and potassium per hectare in 2006 to 50 kg by 2015, which was merely approximately half of the world average of 95 kg in 2006 (Alliance for a Green Revolution in Africa, 2019).

Even that relatively modest goal has not yet been achieved, however, because smallholders, who constitute most farmers in the region and who farm most of the land, apply little or no inorganic fertilizers. The most recent statistics (from 2020) show that the use of fertilizer in Africa, excluding North Africa, is 22.5 kg/ha, relative to a global average of 146 kg/ha (World Bank, 2023b). African efforts to increase the use of fertilizer need to be reinforced. The continent has the raw materials, in particular from its reserves of phosphates, the oil and gas needed as feedstock and the technical and human capacity to ensure adequate fertilizer production, to provide more and better food for its population.

Achieving that goal is even more important given that the population of the continent is expected to reach 2.4 billion by 2050, almost double the estimated 2022 population of about 1.4 billion. The

substantial growth of the population will further increase the pressure on food security if the current trends of growth in the use of fertilizer stay unchanged.

The Alliance for a Green Revolution in Africa (2019) has identified the following three categories of underlying reasons for the relatively weak use of fertilizers in the continent:

(a). Lack of knowledge: the overall low education and literacy levels in rural African areas result in little or no knowledge of soils and nutrients or of the potential of fertilizer to boost crop yields, and most smallholders have little knowledge about the types of fertilizer to use for different types of soils and crops, or about the correct rate and timing of application;

(b). Lack of financing: smallholders have relatively limited access to the financial services needed to fund the improved application of fertilizer;

(c). Weak incentives: crop yields are subject to a certain level of risk and uncertainty that could lead to the non-optimal use of fertilizer.

1. African agricultural productivity lags behind that of other developing regions

Agricultural productivity in Africa suffers from a low level of adoption of improved land management practices, including adequate fertilizer use. International experience shows that countries that have successfully increased their agricultural productivity have also considerably increased their use of fertilizer.[2]

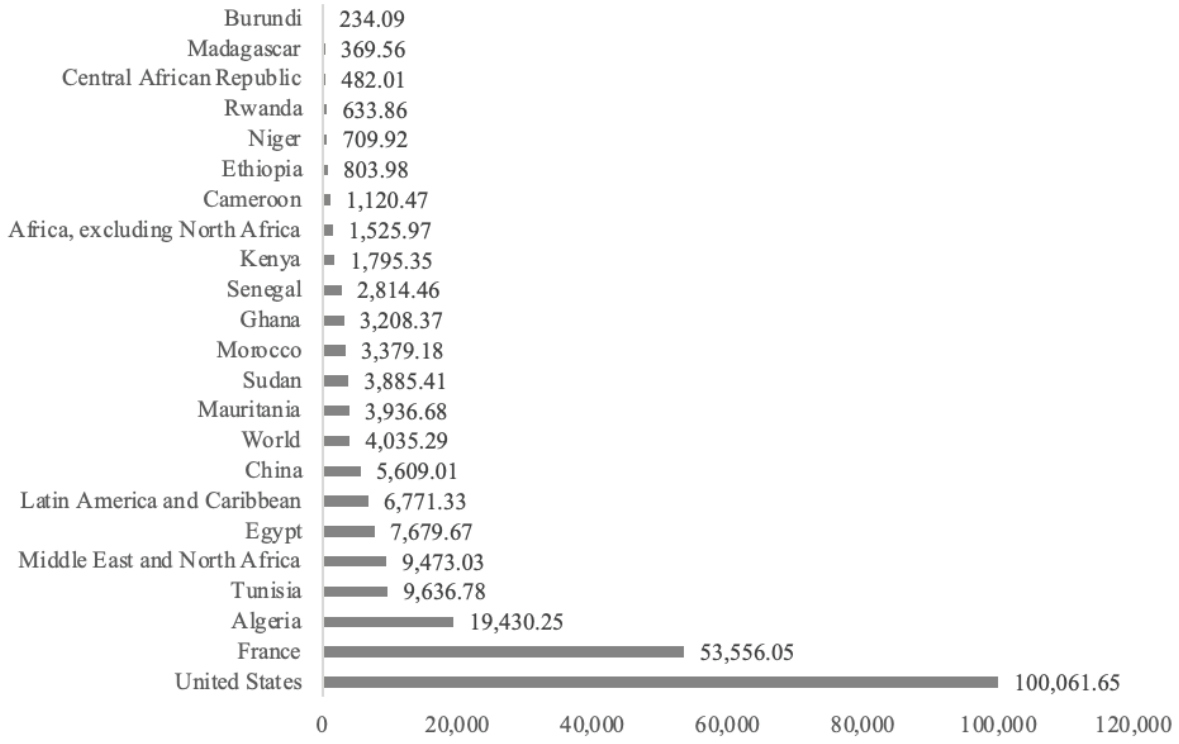
Recent data show that there has been a stable and regular increase in farm production growth in sub-Saharan Africa since 2000, at about 4.3 per cent per year (Jayne and others, 2021). The growth has been driven by higher global food prices and an increase in global demand, but has been achieved primarily through the expansion of cropped area, rather than through improved productivity.

Agriculture accounts for over half of all employment in Africa, but productivity, measured by the value added per worker, is weak. Productivity in Africa (excluding North Africa) in 2019 was approximately 28 per cent of the global average, or $1,526 compared with $4,035 (World Bank, 2023a), as shown in figure III.

Agricultural productivity in North African countries far exceeds the levels elsewhere on the continent. Algeria has the highest productivity, with $19,430 of value added per worker. Egypt and Tunisia have a relatively high value added per worker in the agriculture sector, and the productivity rates of Mauritania, the Sudan and Morocco, in descending order, of $3,937, $3,885 and $3,379 respectively, are relatively comparable to the global average, or are about double the African average. At the other end of the scale, Burundi, the Central African Republic and Madagascar are lagging, with labour productivity of less than one third of the continental average (excluding North Africa) (World Bank, 2023a).

2 Fertilizer application is necessary for nutrient replenishment, increased crop yield and elevated crop biomass, which is necessary for moisture retention and nutrient efficiency.

Figure III: Agriculture value added per worker, selected countries and regions, 2019 (United States dollars)

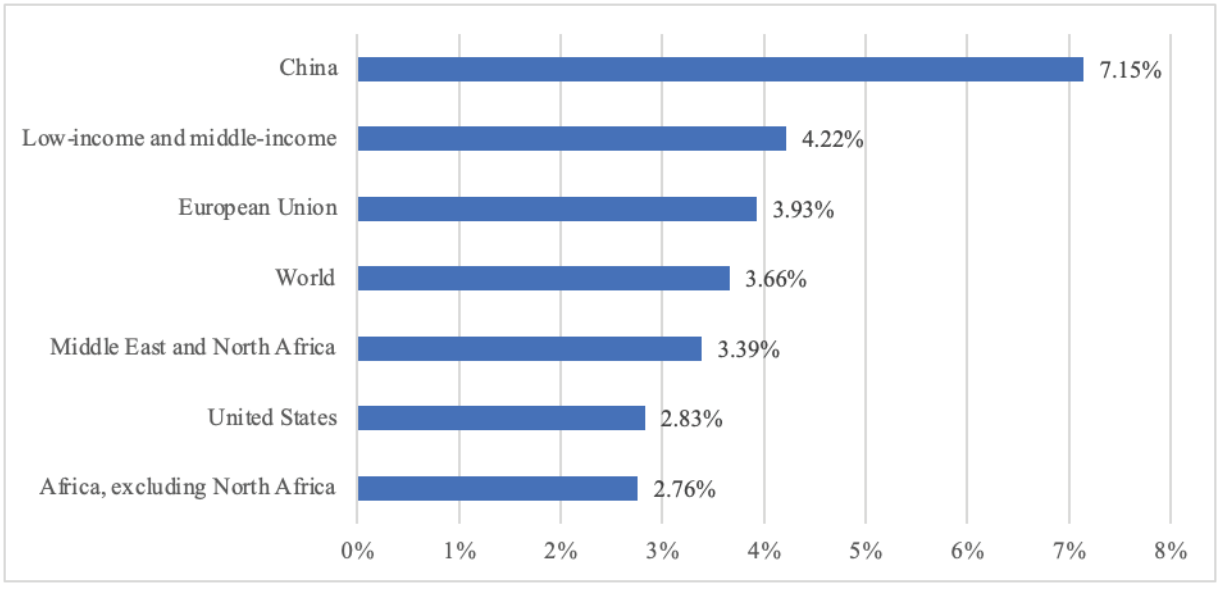


Source: *Author's reconstruction based on World Bank (2023a).*

2. No signs of catching up

As shown in figure IV, Africa, excluding North Africa, has lagged behind most geographical and revenue-based groupings, in terms of agricultural productivity growth over the past two decades. Most of the increase in African agricultural production, as mentioned above, has been achieved from extensive processes rather than productivity growth.

Figure IV: Average annual growth rate in agricultural productivity (1999–2019) (Percentage)



Source: *Author's calculation based on World bank (2023d).*

The agricultural productivity of China for the period 1999–2019 was more than double that of Africa, and the United States of America, the most productive country, achieved productivity growth above the African average for the same period. The African agriculture sector suffers from underemployment and weak sectoral mobility, which undermine its capacity to transform. Furthermore, the chronically low level of agricultural productivity is impeding the structural transformation on the continent.

An increased use of fertilizer would help to raise agricultural productivity. Successful transformation requires complementary industrial policies to ease the sectoral mobility of labour from agriculture to higher-value-adding sectors, such as manufacturing and innovative services.

III. Phosphatic fertilizers: a North African solution for the upcoming harvest and beyond

Africa has the most significant phosphate reserves in the world, and some North African countries are major phosphatic fertilizer producers in the global market (see box 1 for information on the various types of phosphatic fertilizer). Given their share of the market, those countries can avoid the current and future market disruptions to the availability of fertilizer in Africa. To achieve a more affordable and reliable fertilizer supply in the aftermath of the COVID-19 pandemic, African countries could shift from external suppliers to African providers.

A. Phosphate production and reserves

Algeria, Egypt, Morocco and Tunisia are rich in phosphate resources. According to the United States Geological Survey (2022), Morocco holds more than two thirds of the world's phosphate reserves; Egypt, Morocco and Tunisia have the three largest African reserves of the mineral; and, as shown in table 2, in 2021 those three countries were ranked in the top 15 in the world for production.

Table 2: Top producers of phosphates in the world, 2021 (Thousands of tons)

Rank	Country	Production estimates
1	China	85 000
2	Morocco	38 000
3	United States	22 000
4	Russian Federation	14 000
5	Jordan	9 200
6	Saudi Arabia	8 500
7	Brazil	5 500
8	Egypt	5 000
9	Viet Nam	4 700
10	Peru	3 800
11	Tunisia	3 200
12	Israel	3 000
13	Australia	2 200

Source: *United States Geological Survey (2022).*

The phosphate reserves of North African countries are significant. As table 3 indicates, in 2021 the phosphate reserves of Algeria, Egypt, Morocco and Tunisia, which were mainly concentrated in Morocco, represented 78 per cent of all global reserves.

Table 3: Production and reserves of phosphate in Algeria, Egypt, Morocco, Tunisia and the world, 2021

	Production		Reserves	
	Thousands of tons	Percentage of global production	Thousands of tons	Percentage of global reserves
Algeria	1 200	0.55	2 200 000	3.10
Egypt	5 000	2.27	2 800 000	3.94
Morocco	38 000	17.27	50 000 000	70.42
Tunisia	3 200	1.45	100 000	0.14
Total	46 590	21.45	55 100 000	77.61
World	220 000	100.00	71 000 000	100.00

Source: *United States Geological Survey (2022).*

Senegal, South Africa and Togo are other significant African producers of phosphate, with 2.2 million tons, 2 million tons and 1.2 million tons, respectively. Of those three countries, only South Africa has significant reserves, which are calculated to be approximately 1.6 billion tons (United States Geological Survey, 2022).

The relative abundance of phosphate resources in North African countries, and, by extension, their capacity to produce phosphatic fertilizer, puts those countries in a position to play a crucial role for food security in Africa. That role has been strengthened in the current context of the high prices and price volatility of food and fertilizers.

For Africa to feed itself, a more integrated African market for fertilizer is vital.

B. Global fertilizer market dominated by a few

The global market for fertilizer of all types is relatively dominated by a small number of countries: Canada, China, Morocco, the Russian Federation and the United States. According to the International Trade Centre (2023), and as shown in table 4, those five countries controlled almost half (48 per cent) of the global exports of fertilizer, by value, in 2021. The Russian Federation topped the list, with a 15 per cent share of the global market. Morocco, with a share of 7 per cent, was fourth in the global ranking.

Table 4: World's top five exporters of fertilizer, 2021 (Thousands of United States dollars)

Exporter	Exported value	Percentage of global fertilizer exports
World	82 512 585	100.00
Russian Federation	12 494 548	15.14
China	10 943 562	13.26
Canada	6 606 711	8.01
Morocco	5 714 861	6.93
United States	4 051 994	4.91

Source: *Author's calculation based on International Trade Centre (2023) (accessed on 9 August 2022).*

Box 1: Types of phosphatic fertilizer

The primary products of the phosphatic fertilizer industry are phosphoric acid, ammonium phosphate, normal superphosphate and triple superphosphate. Phosphoric acid is sold as is or is used as an intermediate product in producing other phosphatic fertilizer. Monoammonium phosphate is favoured for its high phosphorous content, and diammonium phosphate is favoured for its high nitrogen content. Normal superphosphate has a relatively low concentration of phosphorous but is used in mixtures because of its low cost. Triple superphosphate provides a high concentration of phosphorous, consisting of more than 40 per cent phosphorous pentoxide.

Source: *Cheremisinoff and Rosenfeld (2011).*

Table 5: World's top five exporters of phosphatic fertilizer, 2021 (Thousands of United States dollars)

Exporter	Exported value	Percentage of global phosphatic fertilizer exports
World	30 253 029	100.00
China	6 640 374	21.95
Morocco	5 693 444	18.82
Russian Federation	4 675 508	15.45
United States	2 274 432	7.52
Saudi Arabia	1 837 837	6.07

Source: *Author's calculation based on data from International Trade Centre (2023) (accessed on 9 August 2022).*

Note: *The analysis is focused on phosphatic fertilizer, as reported under Harmonized System codes 3103 and 3105, excluding code 310590.*

More than half of all exports of phosphatic fertilizer originates in three countries: China, Morocco and the Russian Federation. They provide, respectively, 22, 19 and 15 per cent of the global market's needs (see table 5).

The trade restrictions adopted by major fertilizer producers, such as China and the Russian Federation, are providing North Africa with a market opportunity. The subregion could increase its market share by providing the fertilizer required for the current and future seasons across the world. That can be achieved if the production capacity of the subregion and the required transport infrastructure are available and flexible enough to respond in an agile manner to the relative increase in the global demand for fertilizer.

Africa is one of the most affected regions of the globe in terms of food security, and the availability and affordability of fertilizer are crucial to overcome current and future global food crises. According to the Food and Agriculture Organization of the United Nations (FAO) and others (2022), the continent is one of the most food-insecure regions of the world, with a severe food insecurity rate of 23.4 per cent of the population, compared with the world average of 11.7 per cent, and a rate of moderate insecurity of 34.4 per cent, compared with a world average of 17.6 per cent. Moreover, in 2020, 79.9 per cent of the African population (or 85.0 per cent, excluding North Africa) could not afford to maintain a healthy diet, compared with the world average of 42.0 per cent.

C. Africa and the global phosphatic fertilizer market

In 2021, imports of fertilizer to Africa represented 5.4 per cent of the global import market. As shown in table 6, five countries – Djibouti, Ethiopia, Kenya, South Africa and Zambia – dominated those imports, accounting for more than half (53.6 per cent) of all imports of fertilizer to Africa that year.

Table 6: Top 10 fertilizer importers in Africa, 2021 (United States dollars)

Importer	Imported value
World	95 552 145
Africa (aggregated)	5 146 535
South Africa	1 033 059
Ethiopia	590 893
Zambia	438 397
Kenya	355 446
Djibouti	341 870
Morocco	291 198
Côte d'Ivoire	219 742
Nigeria	208 066
United Republic of Tanzania	205 817
Egypt	178 873

Source: *Author's calculation based International Trade Centre (2023) (accessed on 22 June 2022).*

According to the International Trade Centre (2023), and as shown in table 7, Morocco dominated exports of fertilizer from Africa in 2021, with 53.4 per cent of the continent's exports. Africa's share of global fertilizer exports that year was 13 per cent. The other main African exporters were Algeria, Egypt, Nigeria, South Africa and Tunisia. The relative importance of North Africa in producing and exporting fertilizer underlines the role that the subregion could play in supporting the aim of the continent to feed itself, by providing the required fertilizer. In 2021, the share of North Africa among all exports of fertilizer from Africa was 83.2 per cent. The performance of the subregion is mainly attributable to sales of phosphatic fertilizer.

Table 7: Top 10 fertilizer exporters in Africa, 2021 (United States dollars)

Exporter	Exported value
World	82 512 585
Africa (aggregated)	10 702 484
Morocco	5 714 861
Egypt	1 471 253
Algeria	1 359 543
Nigeria	949 793
South Africa	415 474
Tunisia	362 751
Libya	79 356
Mozambique	68 720
United Republic of Tanzania	63 745
Kenya	62 001

Source: *Author's calculation based on International Trade Centre (2023) (accessed on 21 June 2022).*

In 2021, the value of phosphatic fertilizer imported to Africa amounted to about $2.1 billion, which represented around 6 per cent of the global market. The five main African importers of phosphatic fertilizer were Côte d'Ivoire, Djibouti, Ethiopia, Kenya and South Africa, as shown in table 8 (International Trade Centre, 2023).

Table 8: Africa's imports of phosphatic fertilizers, 2021 (Thousands of United States dollars)

Importers	Imported value
World	34 919 813
Africa (aggregated)	2 087 160
Ethiopia	360 914
Djibouti	257 895
Kenya	239 057
South Africa	223 580
Côte d'Ivoire	135 422
Nigeria	107 935
Zambia	86 990

Source: *Author's calculation based on International Trade Centre (2023) (accessed on 22 June 2022).*

A relatively large share of imports of phosphatic fertilizer in Africa derives from the continent itself: almost 59 per cent of 2021 imports on the continent were traded among African countries (International Trade Centre, 2023). Some countries, including Djibouti, Ethiopia and Nigeria, sourced more than 95 per cent of their needs from African suppliers. Shifting suppliers to Kenya, South Africa and the United Republic of Tanzania from outside the continent to Africa will increase the integration rate by an additional 26 per cent.

In addition to the potential for expanding the intra-African trade in phosphatic fertilizer by replacing external suppliers with African producers, in particular for those importing countries that currently have a relatively high dependency on suppliers outside the continent, the increase of fertilizer use across the continent would provide producers of African phosphatic fertilizer with additional market opportunities.

Fertilizer use in Africa remains among the weakest in the world. The chronic food insecurity of the region and the need to increase the use of fertilizer to boost agricultural productivity should incentivize policymakers to strengthen continental and subregional initiatives and further expand the use of fertilizer.

IV. Regional and national initiatives to promote the use of fertilizer

Global trade disruptions caused by the COVID-19 pandemic and the conflict between the Russian Federation and Ukraine are incentivizing African economies to diversify their food and energy suppliers, switching to the continent in order to avoid unexpected and costly interruptions in supply. Africa has the resources required to implement African solutions. Greater continental integration, driven by the implementation of the Agreement Establishing the African Continental Free Trade Area, could be leveraged to mobilize African solutions to address the chronic food insecurity on the continent, in particular by guaranteeing access to fertilizer. The African Trade Exchange Platform has been established to fulfil that role, and other continental initiatives have been used to improve trade finance.

North African countries that are producers of phosphatic fertilizer could use those supportive continental platforms in their strategies to respond to the African need for fertilizer.

A. African Trade Exchange Platform

The Economic Commission for Africa (ECA) is supporting its members in facing the current food crisis and reducing its severity through the establishment of the African Trade Exchange Platform, a business-to-business and business-to-Government e-commerce platform. As a pooled procurement marketplace, the Platform has the potential to connect both sides of the continental markets for critical goods, such as basic commodities, to ensure that countries have access to scarce supplies in a transparent manner. The Platform is intended to strengthen African economic resilience in the context of the current global market disruptions.

The Platform was developed by ECA and the African Export-Import Bank, in collaboration with the African Union and the secretariat of the African Continental Free Trade Area, and can mitigate supply shocks through the pooling and aggregation of African demand and supply to enable the negotiation of competitive prices, and by facilitating the delivery of essential commodities, such as fertilizer, at affordable prices while boosting regional trade. It supports the implementation of the Agreement Establishing the African Continental Free Trade Area by providing buyers and States with quality products from verified suppliers efficiently and at an average cost.

The Platform will play a crucial role in accelerating food sovereignty through the revitalization of African agricultural production by connecting the demand for the main agricultural commodities and inputs, specifically fertilizer, to major suppliers on the continent. It is also anticipated that the platform will support the expansion and creation of regional value chains for agrifood processing.

The Platform was launched in May 2022, and it is too early to assess its effectiveness in facilitating the connection between demand and supply of fertilizer at the continental level. Its success clearly depends on the degree of its use by the African private sector and by supportive Governments, from both sides of the markets. The continued promotion of the features of the Platform by the coordinating institutions that supported its establishment is also critical.

Overall, the facilitation of trade through the reduction of non-tariff barriers on the continent is key for the implementation of the Agreement Establishing the African Continental Free Trade Area, and will have a direct impact on the degree to which the Platform is used by the intended stakeholders and on the extent to which it can contribute to delivering an African solution to ease the current food and energy crisis.

B. Africa Fertilizer Financing Mechanism

The Africa Fertilizer Financing Mechanism was established in 2007 as an outcome of the Africa Fertilizer Summit, held in Abuja in the previous year (see box 2). The ministers and senior officials attending the summit agreed to establish the Mechanism to enhance pan-African agricultural productivity by promoting the use of fertilizer. At the Summit, the African Development Bank was charged with establishing and hosting the Mechanism.

Box 2: Abuja Declaration on Fertilizer for an African Green Revolution

The Abuja Declaration on Fertilizer for an African Green Revolution was made at the Africa Fertilizer Summit, held in June 2006 in Abuja. The Declaration led to the establishment of the Africa Fertilizer Financing Mechanism, administered by the African Development Bank. Pursuant to the Declaration, ministers of agriculture of the African Union:

a. Recognized that Africa needed a Green Revolution which was long overdue and yet constituted the way of getting African farmers out of the poverty trap by achieving food security and other relevant Millennium Development Goals;
b. Recognized that fertilizer was crucial for achieving an African Green Revolution in the face of rapidly rising population and declining soil fertility;
c. Realized that most farmers in Africa were poor, had virtually no access to fertilizer and that the poorest of them urgently needed special attention;
d. Recognized the urgent need for a strategic investment programme to increase the availability and use of fertilizer alongside other inputs to usher in the Green Revolution on the African continent;
e. Declared fertilizer, from both inorganic and organic sources, a strategic commodity without borders; and
f. Resolved that the African Union members would accelerate the timely access of farmers to fertilizers.

Given the strategic importance of fertilizer in achieving the African Green Revolution to end hunger, the members of the African Union resolved to raise the use of fertilizer from the average of 8 kg per hectare (in 2006) to an average of at least 50 kg per hectare by 2015. One of the main reasons explaining the failure to achieve that objective is the poor governance framework, including a lack of suitable policies and laws and the poor implementation and enforcement of those in place (Alliance for a Green Revolution in Africa, 2019).

The objective of the Africa Fertilizer Financing Mechanism is to provide financial solutions to facilitate access to high-quality and affordable fertilizer in Africa. Through the Mechanism, three credit guarantee schemes have been put in place for the financing of fertilizer in Africa, more information on which is set out in box 3.

Box 3: Credit guarantee schemes of the Africa Fertilizer Financing Mechanism

Portfolio credit guarantee

The scheme is aimed at mitigating the risks around working capital and is targeted at wholesalers, distributors, agrodealers and retailers. It gives a participating financial institution permission to attach a partial credit guarantee to any beneficiary that meets the eligibility criteria and to which the partnering financial institution has decided to provide a working capital loan or credit facility. The guarantee covers 50 per cent of the unpaid part of the loan principal, plus interest payable at the moment the guarantee is called by the financial institution.

Portable credit guarantee

The scheme is targeted at private importers, blenders, wholesalers and distribution companies in need of investment capital. The Africa Fertilizer Financing Mechanism, through its local implementing partner, decides whether to provide a commitment agreement for a guarantee to the target beneficiary. The commitment agreement offers a confirmation by the Mechanism that a portion of a potential loan can be guaranteed. The beneficiary can use that commitment to shop for a competitive interest rate at various financial institutions. The guarantee covers 50 per cent of the unpaid part of the loan principal, plus interest payable when the guarantee is called by the financial institution.

Trade credit guarantee

The trade credit guarantee operates at two levels. The first level entails a guarantee from upstream suppliers to hub agrodealers, and the second level is from hub agrodealers to retail agrodealers. Under the model, a fertilizer importer, manufacturer or supplier will provide fertilizer to hub agrodealers on credit, and the Africa Fertilizer Financing Mechanism will share the credit risk involved in the transaction equally with the supplier. The hub agrodealer will then supply the product on credit to distributors, and the chain will continue until the fertilizer reaches the smallholders.

Source: *African Development Bank (2023).*

The mix of credit guarantees that African farmers can use to access fertilizer markets and improve the use of fertilizer, as facilitated by the Africa Fertilizer Financing Mechanism and with the establishment of the African Trade Exchange Platform, is intended to respond to some of the market failures that Africa has experienced. Both of those initiatives will facilitate the access of small-scale farmers to markets and will support them in increasing their use of fertilizer produced in Africa.

C. Subsidy schemes

The continent-wide measures to facilitate access to fertilizer are complemented at the national level by subsidy schemes, which some consider to be controversial.

1. Cases for and against

Fertilizer markets in Africa remain underdeveloped, fertilizer application rates and associated yields are low and agricultural production mostly relies on rainfall (Duflo, Kremer and Robinson, 2011). In addition to higher marketing costs related to regional and national supply-side constraints, which include a lack of adequate infrastructure or market information and limited access to credit, African farmers may be facing high input prices resulting from market power exertion. Ignoring those issues prevents a full understanding of the industry supply chain and could limit the effectiveness of policies designed to promote the development of input markets in Africa.

Input subsidy programmes are the most important agricultural development strategies in many African countries and have substantial implications for national budgets and agricultural investment. Fertilizer

subsidies in Africa have been a source of lengthy economic, political, academic and public policy debates and remain controversial. Many development economists and international development agencies point to the high cost and limited effectiveness of fertilizer subsidies, noting that past subsidy programmes, which often involved State monopolies in fertilizer marketing, have undermined the emergence of efficient and widespread private input distribution networks. Some studies show that fertilizer subsidies crowd out commercial fertilizer use and are hampering the development of the commercial fertilizer sector (Ricker-Gilbert, Jayne and Chirwa, 2011; Ricker-Gilbert and Jayne, 2017). For instance, Ricker-Gilbert, Jayne and Chirwa (2011) have shown that fertilizer subsidies have reduced demand for commercial fertilizer in Malawi. Moreover, there are significant opportunity costs to devoting public funds to subsidizing fertilizer, rather than investing in market development, agricultural research, transportation infrastructure or other public goods to achieve national development goals (Morris and others, 2007).

Proponents of subsidies believe, however, that fertilizer subsidies are the only way to jump-start African agriculture and deliver food security and income benefits to people living in poverty in rural settings (Dugger, 2007). Agronomists view such subsidies as a way of reversing the depletion of soil nutrients in Africa. Several studies show that fertilizer subsidy programmes have increased the intensity and productivity of fertilizer use (Chibwana and others, 2014; Jayne and others, 2013). Political leaders often view fertilizer subsidies as a simple way to assist rural households quickly, and some development agencies see such subsidies as central to achieving a green revolution in Africa. These proponents argue that Governments can avoid the mistakes of the past by implementing so-called smart subsidies, which are targeted at those living in poverty and which support the development of private input distribution markets, rather than undercutting them. Input vouchers have been proposed as a way to make fertilizer subsidies smart. Nonetheless, such schemes are not appropriate or cost-effective in all situations, and it is important to clarify the conditions under which fertilizer subsidies and vouchers make sense.

The economic case for fertilizer subsidies in Africa rests on the perceived market failures that have led to farmers using inefficiently low levels of fertilizer. Many African smallholders seem to use much less fertilizer than is economically optimal. They may use too little fertilizer because they lack information on its effective and profitable use, and they may not have the cash to pay for it because of low incomes and poorly functioning credit markets. Input subsidy programmes in Africa suffer from targeting problems: vulnerable and poor farmers are often not sufficiently targeted. If subsidies can help farmers to reach optimal application rates, such that the additional farm income exceeds the cost of the subsidy programme, the subsidies can be justified on efficiency grounds. Alternatively, if fertilizer subsidies are a cost-effective way of assisting the people living in poverty in rural settings, they can be justified on equity grounds (Chibwana and others, 2014).

A growing body of evidence has shown that the bulk of the benefits of such subsidies has gone to larger and richer farmers, thus undercutting the equity argument for the subsidies. Under the structural adjustment programmes of the International Monetary Fund and the World Bank, most African countries phased out fertilizer subsidies and opened up fertilizer markets to competition from the private sector, as part of wider market reforms in their economies.

2. Smart subsidies: an alternative aimed at the private sector

Smart subsidies are mechanisms to provide subsidized goods and services. They are designed to promote market development and to enhance the welfare of less advantaged populations. The provision of goods and services at below the market cost, generally by private-sector suppliers, from which the less advantaged populations in particular are likely to benefit, can be considered smart subsidies.

A common approach to designing smart subsidies for fertilizer use involves input vouchers. Farmers are given vouchers that they can take to local, typically small-scale, private input suppliers to acquire fertilizer. The cost of the fertilizer for the farmer is reduced by the value of the voucher. The supplier, having provided fertilizer for the farmer in exchange for the voucher and any additional cash cost beyond the value of the voucher, takes the voucher to a bank or other designated agency and is reimbursed for its value, plus a handling fee. The voucher is an income transfer to the farmer from the Government, donor or implementing agency, but the transfer can be made only through private sector suppliers. For the input suppliers, the vouchers are a way to guarantee demand (and a profit margin) for the fertilizer that they supply, potentially enabling them to secure economies of scale in their business, reduce some of their risk and put their businesses on a sound financial footing (Gregory, 2006; Carter, Laajaj and Yang, 2013). In theory, input vouchers have many advantages over direct in-kind provision of subsidized fertilizer to farmers from the Government, interventions affecting the entire national fertilizer market or other forms of fertilizer subsidy, and they could help with the development of exit strategies for the private sector distribution network if they are reduced in value over time or converted to a crop production credit that is repaid upon the harvest.

Input vouchers have disadvantages, too, however, depending on the way they are implemented. Administrative costs can be high, particularly if the Government attempts to target certain types of households, such as small-scale farmers, and the vouchers may leak out of the target group if the intended beneficiaries resell them to others.

Targeting fertilizer subsidies can reduce costs and make the subsidy more beneficial for less advantaged populations, but the administrative targeting of less advantaged households has not had encouraging results. One effective way to target such households is to offer free or subsidized inputs in a quantity that is small enough to interest small-scale farmers but not larger farmers. Another approach to targeting is to provide fertilizer in exchange for the provision of labour for public works, which will interest less advantaged households more than their wealthier neighbours. Both approaches can be implemented with input vouchers.

III. Africa needs sustainable soil management

Climate change consequences, such as water scarcity and drought, present a major challenge to African efforts to achieve the goal of feeding itself. Africa can sustainably feed itself only if it continuously adapts to the intensifying impacts of climate change. Such adaptation includes sustainable soil management.

Land degradation is a major problem facing many countries in Africa, where intensive agricultural practices have negative consequences on soil and on food systems (Swift and others, 2006). Some 33 per cent of land worldwide is moderately to highly degraded because of erosion, salinization, compaction, acidification and chemical pollution (FAO and Intergovernmental Technical Panel on Soils, 2015), and 52 per cent of agricultural land is moderately or severely affected by soil degradation (Economics of Land Degradation Initiative, 2015). Soil loss globally could cost $400 billion annually and, by 2040, lead to a 12 per cent decrease in food productivity and a 30 per cent increase in food prices (Economics of Land Degradation Initiative, 2015).

In Africa, up to two thirds of productive land area is affected by land degradation (see Global Risk Forum GRF Davos, 2013). Most African soils are fragile, with low levels of nutrients and a low concentration of organic matter, owing to poor management practices, including the unbalanced application of fertilizer, that have led to the decline in the biological, chemical and physical quality of the soil.

Moreover, climate change, in particular through its effects on soil quality, poses a major threat to Africa. Even if inorganic chemical fertilizer can partly address the problems of nutrient poverty in some soils, the use of inorganic fertilizer alone is not sustainable. The use of soil supplements must be considered beyond a yield perspective and with a view to integrating long-term soil health, which is the only guarantee of long-term sustainable production.

The adaptation of crops to climatic conditions in which less water may be consumed and high heat resistance is required is an important element of a sustainable agriculture strategy. Agricultural production in North and East Africa is threatened by drought and the risk of salinization, owing to a lack of rainfall and water evaporation, and to reduced moisture retention in soils with a low content of organic materials. Soil organisms are essential for soil fertility, and soil regeneration is particularly important in those subregions.

The optimal use of inorganic fertilizers must, therefore, be part of a coherent strategy to increase yields and improve soil fertility in a sustainable manner. The development of sustainable agriculture is becoming a global emergency, and Africa must improve its sustainable soil management.[3]

Accordingly, increasing the use of fertilizer is not sufficient in itself. Integrated soil fertility management requires a combination of the increased use of inorganic fertilizer and organic interventions to maintain soil carbon, promote soil biology and diversity, and improve soil health. Other good agricultural practices must be focused on alleviating soil constraints and using improved germ plasm. In addition, irrigation, soil and water conservation and mechanization, improved pest and disease management and better

3 Sustainable land management includes the use of animal manure, compost and green manures, fallow practices and the establishment of agroforestry systems.

farmer organization are just some of the recommended policies and measures concerning production techniques that have been recommended for implementation (Alliance for a Green Revolution in Africa, 2019).

IV. Conclusion and policy recommendations

Algeria, Egypt, Morocco and Tunisia are rich in phosphate resources, holding 77.6 per cent of global reserves. Morocco alone holds 70.4 per cent of global phosphate reserves. Senegal, South Africa and Togo are other significant African producers of phosphate, but among those three countries only South Africa has significant reserves. North Africa, therefore, has a central role in supplying phosphatic fertilizer to the rest of the continent.

Currently, the use of fertilizer on the continent remains among the weakest in the world. The chronic and currently heightened level of food insecurity underscores the need to increase the use of fertilizer to elevate agricultural productivity to feed the continent better. North Africa, with its phosphate resources, can play a central role in achieving that objective.

The trade restrictions that are being imposed by major fertilizer producers, such as China and the Russian Federation, are providing North Africa, in particular Morocco, with an enormous opportunity to increase its market share by providing the required fertilizer across Africa. That can be achieved only if the production capacity of the subregion and the required transport infrastructure are available and flexible enough to respond in an agile manner to the relative increase in the global and continental demand for fertilizer.

The Agreement Establishing the African Continental Free Trade Area must play a central role in mobilizing African solutions to the current crisis, in particular by guaranteeing access to fertilizer. The countries of North Africa can use several continental initiatives, such as the African Trade Exchange Platform, in their strategies to respond to the need for fertilizer.

To support the growing role of North Africa in supplying the rest of the continent with phosphatic fertilizer, the following policy recommendations, inspired by FAO and the World Trade Organization (2022), must be implemented.

At the global level:

(a). Gas-producing countries should take steps towards curbing increases in gas prices by removing export and other restrictions on supply and reducing emissions, alleviating some of the pressure from rising fertilizer prices;

(b). The root causes of global supply disruption should be addressed, including by facilitating fertilizer exports from Belarus, the Russian Federation and Ukraine;

(c). The mandate of the World Trade Organization in improving market and policy monitoring should be supported by tracking funding schemes, such as subsidies, and through other support mechanisms in response to the disruption of fertilizer markets;

(d). International development cooperation should prioritize programmes for soil nutrition analysis and enhancement in Africa in order to optimize fertilizer use;

(e). Good practices in exchange and South-South cooperation on fertilizer subsidy schemes should be promoted to reduce distortions and identify the most efficient policies and measures in promoting fertilizer use;

(f). Development partners should align their engagement with development programmes in Africa, including in fertilizer use, production and trade.

At the continental level:

(a). The African Union Commission should take the lead and take ownership of the African Trade Exchange Platform for an effective pooling of demand for fertilizer in Africa and to mobilize supply;

(b). Further investment should be made in transport infrastructure to improve connectivity and ease trade in agriculture inputs within Africa;

(c). Adequate and timely measures should be considered to support an improved fertilizer trade within the framework of the Agreement Establishing the African Continental Free Trade Area;

(d). Objectives should be revitalized and the implementation of the Comprehensive Africa Agriculture Development Programme should be progressed through a continental dynamic involving the African Union Commission and its members;

(e). Implementation of the Africa Fertilizer Financing Mechanism credit guarantee schemes should be scaled up, and access to the related services should be widened for small-scale farmers;

(f). Existing effective fertilizer schemes and instruments dedicated to small-scale farmers should be reinforced and scaled up.

At the subregional level, steps should be taken to:

(a). Develop a subregional value chain in the phosphates sector, including for fertilizer, by mutualizing the available mineral, financial and technical resources;

(b). Revitalize existing subregional and bilateral trade agreements and improve infrastructure in the subregion to facilitate trade in inputs, including gas;

(c). Update and implement the subregional action plan for trade facilitation aimed at promoting greater regional integration in North Africa, as developed by the Subregional Office for North Africa in 2016;

(d). Develop bilateral and subregional partnerships with import-dependent African countries, with the objective of promoting trade and constructing industrial plants for local fertilizer production;

(e). Support the efforts of import-dependent African countries in research and development, in particular in soil analysis, fertility maps and biodiversity;

(f). Reinforce South-South cooperation and sharing of experience with the rest of the continent, with the objective of creating new, and scaling up existing, continental fertilizer value chains;

(g). Develop innovative and adapted fertilizer solutions, including by promoting tailored research and development, to tackle the negative aspects of climate change, in particular the effects of droughts.

At the national level, policies for Morocco will clearly differ from those of other countries in North Africa, given that the country holds 70 per cent of the global phosphate reserves.

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