AfricaFertilizer.org

REVIEW OF FERTILIZER USE BY CROP IN ZAMBIA

2019 EDITION

FINAL DRAFT

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1.Introduction

1.1 Background of the study

The need to understand national fertilizer consumption, is key for stakeholders on both sides of the divide i.e. public and private sector. Trade data, which is readily available, provides a good starting point on the fertilizers available in the market in a given period/season, however, a further step to assess the consumption and develop data sets by region/agro-ecological zones ,by crop (major crops both staple and cash crops), by fertilizer nutrient (N, P, K, S, Ca etc.), provides a better understanding on what the actual application rates (based on land cultivated) and volumes (by product) consumed by farmers. All this being important for:

Public sector- Monitor agricultural productivity; monitor achievement of Abuja/Malabo declarations; research on nutrient recommendation (by crop and region); develop fertilizer policies (availing the appropriate fertilizers in the market-through subsidy or regulations) etc.

Private sector- Monitor demand and supply; Gap analysis of appropriate fertilizers; investment in soil and crop nutrient uptake analysis, installation of processing facilities etc.

1.2 Purpose of the study

In 2013, as part of AfricaFertilizer.org's (AFO) mandate to improve access and availability of essential fertilizer statistics in Africa, such as production, trade and consumption, AFO commissioned a series of studies in Sub-Saharan Africa (SSA), to provide best estimates of current (national) fertilizer consumption and Fertilizer Use by Crop (FUBC). These studies have so far been conducted in Mali, Burkina Faso, Cote d'lvoire, Ghana, and Nigeria in West Africa; and Ethiopia, Kenya, Mozambique, Tanzania and Uganda in Eastern and Southern Africa. AFO is looking to extend these studies to cover additional countries, and thereafter have reports updated every 2 years. New countries include Zambia, Zimbabwe and Malawi in Southern Africa and Senegal in West Africa

The overall purpose of this study was to describe real consumption of fertilizers and Fertilizer Use by Crop in Zambia for the period ranging from 2014 to 2018.

2.Methodological framework

Two methods were employed in collecting data and information in this study, these are:

(1) Desk study or secondary data from various past studies

(2) Empirical or primary data collection through interviews with key players in the fertilizer value chain including both Government and private sector.

However, the wealth of information in this study was derived from the desk study of previous reports on studies and surveys conducted mostly by Government departments and agencies such as the various departments in the Ministry of Agriculture (Policy and Planning, Farmer Input Support Program, Extension, Cooperatives, etc.) which gave data on major crops, cultivated area, yields and fertilizers used. The Central Statistics Office (C.S.O.) and Zambia Revenue Authority (Z.R.A.) provided most of the data on imports and exports of fertilizers in Zambia. Data on fertilizer production and types was obtained mostly from manufacturers and traders such as Nitrogen Chemicals of Zambia (N.C.Z.), Zambian fertilizers, YARA, Export Trading Group (E.T.G.), etc. The Indaba Agricultural Policy Research

Institute (IAPRI), a nonprofit Zambian enterprise, conducts high quality research on agricultural policy issues and was an important source of secondary data in this study.

Primary data was obtained mainly by interviews with agro dealers and a few farmers in the periphery of the capital city, Lusaka.

Table 2.1:SWOT Analysis of data and data source

Data Type	Main Data Source	SWOT Elements	
Data on Imported and Exported Fertilizers	Zambia Revenue Authority ZRA), Central Statistics Office (CSO)	Strengths	i)Easy means of getting data, ii) Good records, III) have legal authority to access data
		Weaknesses	Tax evaders do not declare true quantities of imports
		Opportunities	introduce stringent measures to avoid tax evasion and under declaration of imports
		Threats	lack of enough staff to effectively combat smuggling and tax evasion
Data on Blended Fertilizers	Companies Blending Fertilizers	Strengths	Data readily available
		Weaknesses	i)Some companies not very forthcoming with production figures, iii) there are also too many formulations
		Opportunities	i)Most blenders are based in Lusaka, within easy reach, ii) Formation of an association and enhancement of data provision
		Threats	i) No legal framework for data provision to government; ii) Low awareness by managers of some companies on the value of data provision to the government.
Data on Fertilizer Distribution and uptake by Farmers	Farmer Input Support Program (FISP), Zambia Cooperatives Federation (ZCF), Ministry of Agriculture Early Warning System	Strengths	Accessible and reliable data due to direct government involvement in provision of fertilizers to farmers
		Weaknesses	government distributes mostly Urea and Compound D fertilizers for top and basal dressing respectively, hence little reliable data on other fertilizers distribution and uptake
		Opportunities	Introduction of modern tools to enhance data collection and dissemination

		Threats	Newly introduced electronic voucher system for subsidized fertilizer reduces direct government involvement and may lead to decrease in availability of reliable data on fertilizer use by farmers
Data on Actual Fertilizer Used by Crop and by Regions	Ministry of Agriculture Early Warning System, Central Statistics Office, Zambia Cooperatives Federation	Strengths	Large number of Ministry of Agriculture staff for reliable data collection at grassroots level
		Weaknesses	i) Officers at HQ office handling country data are few and overwhelmed by workload, ii) Inadequate funds to support elaborate field mobility
		Opportunities	i) Experienced crops and agribusiness officers deployed at district level to assist with data validation, ii) Introduction of modern tools to enhance data collection and dissemination
		Threats	Inadequate staff deployed to handle statistics at HQ office
Data on Fertilizer Consumption Rates	Ministry of Agriculture Early Warning System, Central Statistics Office, ZARI, Other Researchers	Strengths	i) Accurate data, ii) Data readily available in form of reports and research findings
		Weaknesses	Most research is conducted along line of rail, hence there is little data from remote areas of the country
		Opportunities	There is room for more research and collaboration between interest groups
		Threats	Inadequate collaboration among interest groups

3.Overview of agriculture

In Zambia, the agriculture sector is positioned as one of the key drivers of the growth and diversification of the national economy. The growth of the agricultural sector has a pivotal role to play in attaining the long term vision for Zambia, which is to become "*a prosperous middle income nation by 2030*" under the theme *"Accelerating development efforts towards the Vision 2030 without leaving anyone behind*". The Seventh National Development Plan (7NDP 2017-2021) is a step towards achieving the Vision, which provides a macro-economic framework for improving economic growth, enhance investments in priority growth sectors such as agriculture and attain prosperity through the use of the integrated multi-sectoral development approach. The 7NDP is anchored on contributing to the attainment of Sustainable Development Goals (SDGs) and complementing the initiatives of the New Partnership for Africa's Development (NEPAD) whose main thrust is an emphasis on investments and interventions that can rapidly increase production in the agriculture sector because of its contribution in stimulating economic growth and poverty reduction. Agriculture is one of the priority sectors in achieving sustainable economic growth and reducing poverty in Zambia. Currently, the sector is contributing about 10 % to the Gross Domestic Product (GDP) and employs about 70% of the population, especially women who form 67% of the rural population and it remains the main source of income and employment for both females and males (NAP, 2016 and SNDP, 2013). In spite of this, important economic potential as a source of livelihood for the resource constrained of the agricultural dependent, the Agriculture sector has marginally improved rural incomes and contributed marginally to poverty reduction and increased food and nutrition security. (CSO, Living Conditions Monitoring Survey, 2006 and 2010). However, the sector's vision, has been elaborated in the Second National Agricultural Policy (SNAP) as "*an efficient, competitive, and sustainable agricultural sector, which assures food and nutrition security, increased employment opportunities and incomes*"; aims at significantly contributing to reversing this trend because it is anticipated that an increase in rural incomes will contribute to poverty reduction and increased food and nutrition security.

In Zambia expansion of agricultural production is possible given the vast natural resource base that the country has in terms of land, labour and water. In terms of the physical land resource, 58% (42 million hectares) of Zambia's total land area (75 million hectares) is classified as medium to high potential for agricultural production. It is estimated that only 14% of total agricultural land is currently being utilized. The agriculture sector continues to rely on rain fed agriculture, this renders the sector to weather induced shocks. The average annual precipitation in terms of rainfall ranges between 800mm and 1500mm and the prevailing agro-climatic conditions are suitable for the production of a broad range of crops, fish, and livestock. The underground water, rivers, *dambos*, and lakes provide the country with significant irrigation potential of 500,000 hectares, of which only 65,000 hectares (13 percent) is developed. Zambia's heavy reliance on rain-fed agricultural practices has contributed to the country experiencing weather-induced variations in production. Therefore, investment in irrigation is key in boosting and sustaining agricultural productivity and production, which in turn will contribute to the attainment of the long-term vision for Zambia.

With regard to regional policy impacts, Zambia's agriculture is influenced by developments of the economies of Southern African Development Community (SADC) and Common Market for Eastern and Southern African (COMESA) countries, which are mainly agriculture and mining based. In the SADC region about 61% of the population of 277 million live in rural areas and are engaged in crop and livestock production at subsistence and small-scale levels. The agriculture sector is of major social and economic importance in the SADC region, contributing between 4% and 27% of GDP and approximately 13% of overall export earnings (RAP, 2013). Hence the performance of this sector has a strong influence on food security, economic growth and social stability in the region. There is also great potential for growth in the region based on its natural endowments. Furthermore, the growth in urban population and global demand for agricultural products provides the region with added opportunities, which Zambia can fully exploit because of its affiliation to these regional bodies and central location.

3.1Farming systems

There are three major categories of farmers in Zambia, defined in terms of the land area cultivated by each farmer.

Small-scale farmers, who are the vast majority, cultivate less than five ha, use few external inputs, and consume most of their produce, occasionally entering the market to sell any surplus. The hand hoe is the predominant means of cultivation. Medium-scale farmers cultivate from 5 to 20 hectares. They use improved seeds and fertilizers and sell most of their production. These farmers commonly use a combination of manual, animal draft power and tractors. Large-scale commercial farmers plant over twenty ha annually. These farmers apply high levels of purchased inputs and use oxen or machinery for farm operations. They produce almost exclusively for direct market sale or feed their grain to livestock kept on the farm. Large-scale farmers make up only 4% of farm households but cultivate 22 per cent of all cropped land.

Crop yields depend on the production circumstances, with higher yields on commercial farms and low yields on small-scale farms. Annual maize production in Zambia was on average 1.1 Mt in the period 2000 to 2010, and average yields of about 1.5 t/ha that have not significantly changed over the past 20 years. Cultivated maize area has been on average 700,000 ha between 1987 and 2007, with largest area of 900,000 ha in 2008. The yield gap between actual yields and potential yields remains wide. Zambia produced an annual average of about 24,000 metric tons of sorghum and 42,000 metric tons of millet between 1987 and 2008. Sorghum and millet national average yields are very low, about 0.55 and 0.65 t/ha, respectively.

3.2 Agro-ecological zones

Zambia is divided into three major agro-ecological regions (Regions I, II and III), which are primarily based on rainfall amount but also incorporate soils and other climatic characteristics.

Semi-arid Region I include areas of southern, eastern and western Zambia: Zambia's valleys at 300-800 m altitude mostly lie in Region 1. Mean annual rainfall in Region I ranges from 600 to 800 mm. The growing season is relatively short (80-120 days) and risky for crop production, as poorly distributed rains result in crops enduring frequent dry spells. Region I contain a variety of soil types, ranging from slightly acidic loamy and clayey soils with loam topsoil, to acidic sandy soils. Characteristics of these soils which have significant constraints for crop production, include: erosion, limited soil depth in hilly and escarpment areas, poor physical properties that make it difficult to till especially on cracking clay soils, crusting, and low water holding capacities in sandy soils.

Region II includes much of central Zambia, with most of Central, Southern, Eastern and Lusaka provinces. It contains the most fertile soils and most of the country's commercial farms. Annual rainfall in Region II averages 800-1000 mm, and the growing season is 100-140 days long. Distribution of rainfall is not as erratic as in Region I, but dry spells are common and reduce crop yields, especially on the sandier soils. Average mean daily temperatures range from 23- 26°C in the hottest month October to 16-20°C in the coldest months of June and July. The most common soils in Region II are red to brown clayey to loamy soil types that are moderately to strongly leached. Physical characteristics of the soils that affect crop production, include low water holding capacity, shallow rooting depth, and top soils prone to rapid deterioration and erosion. These soils also have low nutrient reserves and retention capacity, are acid, have low organic matter and nitrogen content, and are phosphorus deficient.

Region III, the high-rainfall area, lies in a band across northern Zambia, including the Northern Luapula, Copper belt, Northwestern provinces and some parts of the Central province. This region receives over 1000 mm of precipitation each year, and the growing season ranges from 120-150 days. Soils in Region III are highly weathered and leached and characterized by extreme acidity. Consequently, the soils have few nutrients available for plant growth, and are high in exchangeable aluminum and manganese, both of which are toxic to most crops unless soils are limed to increase pH

Region I has predominantly small-scale farmers in the major valley systems. In the Luangwa Valley, sorghum, finger millet and maize are the major starchy food crops, while groundnuts, cowpeas and pumpkins are also grown. Farmers use hand hoes for cultivation. Goats and chickens are commonly kept by farm households, and some farmers have a few cattle. Other areas of the region mainly produce bulrush millet, sorghum, and cassava.

Zambia's large commercial farmers are concentrated in Region II. Their farming systems are mechanized and highly diverse, cultivating maize, soybeans, wheat, cotton, tobacco, coffee, vegetables, and flowers, and breeding livestock. Besides these large-scale systems, there are also small- and medium-scale farmers in the region. Maize is the main staple crop in these systems in Central and Eastern provinces. Beans, groundnuts, pumpkins, and cassava leaves are grown to diversify diets. Other crops include cotton, sorghum, soybeans and sunflower. Cattle, chickens, goats, pigs and sheep are common. Farmers also grow tobacco. Cattle are important for traction, meat, milk and manure. The major constraints to increase crop production in Region II are the lack of low-cost biocides to control pests and diseases, soil degradation, and the depletion of soil fertility.

Small-scale farming predominates in Region III. Rural areas of this region have the lowest population density in Zambia. Farmers use very low input, shifting and semi-permanent cultivation techniques. Chitemene and fundikila are two widely used, traditional methods of cultivation. In Chitemene, trees are cut at 1-meter height, branches are heaped in piles and burned, and then crops are planted in the ash. Fundikila is used in cleared fields. Grass is cut and buried at the end of the rainy season and allowed to decompose. The composted material is spread before the next planting season onto frequently mounded fields.

Principal crops in the hand hoe system of Northern, Luapula and Northwestern provinces are cassava, landrace maize varieties, sweet potato, pumpkin, finger millet and beans. Most farmers have chickens and a few goats, but other livestock is uncommon. The existence of tsetse fly in some areas limits opportunities for cattle production.

Currently about 300,000 smallholders are linked to agribusinesses through value chains that are more or less vertically integrated, depending on the crop. The majority of these smallholders participate in contract farming schemes for tobacco, cotton, and sugar; under these schemes, farmers receive inputs and market their output through the agribusiness. They also learn new farming techniques and management skills. In return, agribusinesses secure raw produce for their value-adding activities.

4.The Fertilizer market

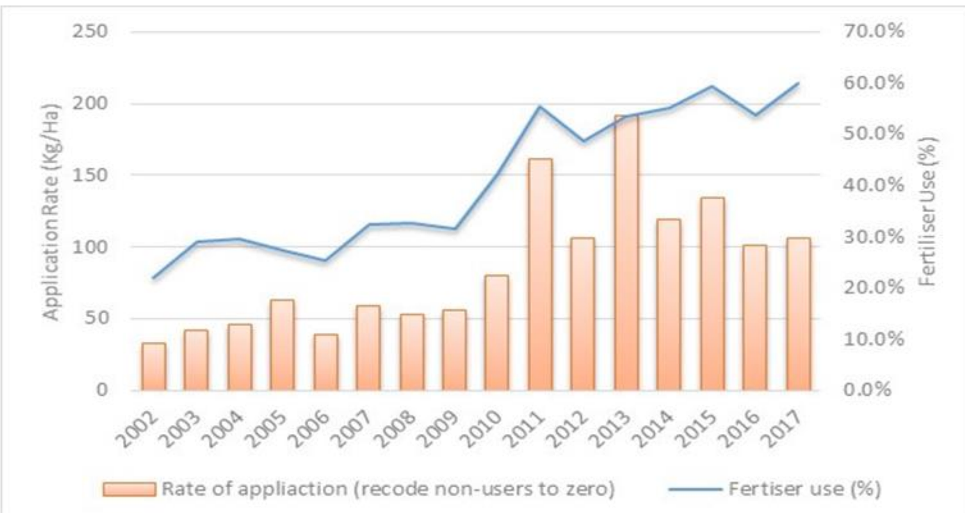
4.1Fertilizer market environment

Zambia has considerable amounts of data on the amounts of fertilizer used. The Ministry of Agriculture's Early Warning Unit (MoA/EWU) collects data annually on total fertilizer use in the small-scale and large-scale farm sectors for 20 individual crops. Currently, the fertilizer sector in Zambia consists of nine major importers, including two domestic blenders and one state-owned manufacturer. With regard to the distribution of nonsubsidized (private) fertilizer, some fertilizer importers have their own licensed agents in major towns and well-established farm areas. Large commercial farmers typically place advance orders directly with the importer or an agent in their area. In some cases, very large agricultural producers may even import their own fertilizer. There are private companies specialized in producing custom-blended fertilizer specifically formulated for each individual client's soil types. In addition, there are several private shops owned by individual traders who typically buy their stocks from importers for selling to smallholder farmers and other producers in their area.

In Zambia, the presence of an organized and active agro-input dealer network is limited. An association exists among the importers, but its membership is limited. In rural areas, where FISP is active, fewer business opportunities currently appear to exist for local private agro-input dealers, although the situation is changing with the introduction of the new e-voucher program on pilot in some districts. Under the pilot e-voucher mechanism, farmers will be free to choose any type of seed or fertilizer they wish from local private dealers. Firms previously excluded from FISP therefore now stand a chance to compete for smallholders' business. The voucher system could also increase the number of local agro-input dealers and thus possibly improve access to and availability of fertilizer in rural areas.

Commercial prices of fertilizer in Zambia are quite competitive in comparison with prices in other countries in the region. In 2018, the average retail price of urea was US$ 30 per 50-kilogram bag, which is lower than in countries like Tanzania and Mozambique, which have seaports. Despite the prices being competitive, the nutrient/output ratio based on commercial prices is rather high in Zambia at 12.7. On the other hand, the nutrient/output ratio calculated on subsidized input and output prices is very reasonable at 1.7. This implies that at commercial prices fertilizer use is not affordable, unless the cost build-up that contributes to current fertilizer prices (specifically, the urea price) is reduced, or unless the output price for maize improves.

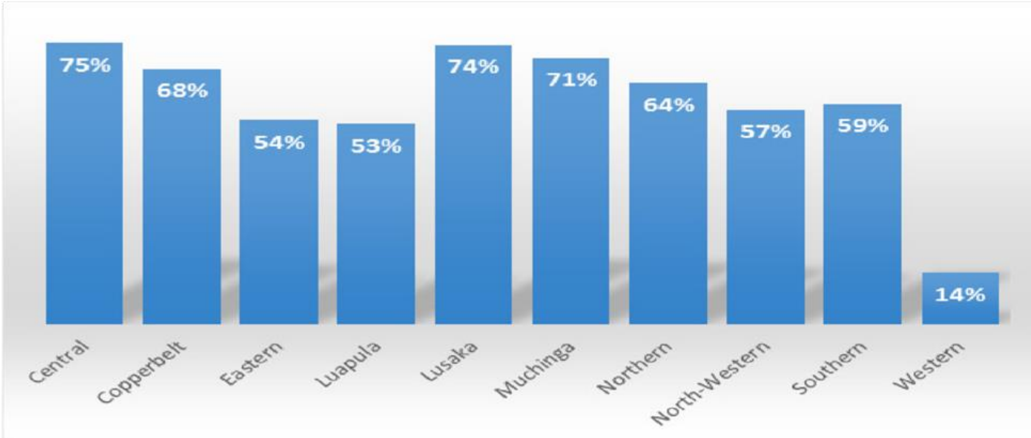
Figure 4. 1: Fertilizer Use and Rate of Use among Small Scale Farmers, 2002 to 2017



Source: CFS, (2002 – 2017)

Figure above shows the percentage of households that used fertilizer over the period 2002 to 2017. Nationally, about 59.9 percent of the rural households reported using fertilizer in the 2016/17 agricultural season. Most of the fertilizer was used for maize production. The proportion of households using fertilizer in 2017 increased by 6.2 percentage points from 53.7 percent in 2016. Fertilizer use varied by province, with Central Province having the highest percentage (74.9 percent) of farmers that used fertilizer followed by Lusaka with 74.4 percent (Figure 11). Similar to other years, Western Province on the other hand had the least percentage of farmers that used fertilizer, with only 13.7 percent reporting using fertilizer in 2016/17 agricultural season. The total fertilizer used among the smallholder farmers in Zambia increased by 26 percent, from 286,497 MT to 361,091MT (MoA and CSO, 2017). In the past 10 years, there has been an upward increase in the percentage of farmers reporting using fertilizer as well as the rate of fertilizer application as shown in figure 10. The average fertilizer use per hectare (Ha) in 2017 was 227.5 Kilograms per Ha among fertilizer users compared to 187.7 Kilograms per Ha in 2016, a 21.2 percent increase.

Figure 4. 2: Fertilizer Use by Province among Small Scale Farmers, 2002 - 2017



Source: CFS, (2002 – 2017)

4.2 Farmer Input Supply Program

The Farmer Input Support Programme (FISP) has been in place since 2002, but has been marred with several weaknesses. The overall objective of FISP is to increase private sector participation in the supply of agricultural inputs to small-scale farmers, and contribute to increased household food security, improve agricultural productivity, and income. Due to the weaknesses associated with the program, very few of these objectives were met. The Government in 2015 and 2016 piloted the E-voucher, first in 13 districts during the 2015/16 agricultural season, and expanded to 39 districts during the 2016/17 farming season. The Government in 2017 started the process of rolling out the e-FISP countrywide for the 2017/18 farming season.

For a successful rollout, the Government was urged to timely fund the programme, in order for farmers to redeem agro inputs early as well as sensitise all stakeholders to ensure they clearly understood the program objectives clearly. The sensitisation programme, among other things, needed to clearly spell out the Dos and Don'ts for farmers, cooperatives, agro-dealers, banks and MoA staff, to help facilitate the smooth operations of the programme. In addition, farmers should be reminded about the objectives of the subsidy and the requirements for participation especially the down payment before Government tops up the balance. The system when fully functional will use the e-farmer register with more than 1.2 million farmers. The e-system would help monitor the implementation of the programme in real time.

Table 4. 1: FISP Input Allocation 2014, (2014 to 2017)

Season	Fertilizer (MT)	White Maize (MT)	Rice (MT)	Sorghum (MT)	Grounnuts (MT)	Soybeans (MT)	Cotton (MT)	Orange Maize (MT)	Common Beans (MT)	Sunflower (MT)
2013/14	188,311.60	9,000	158.9	119.1	153.6					
2014/15	208,235.75	10,000	127	119.1	1,357.10					
2015/16	208,235.75	761.95	127	119.1	1,357.10	776.5	155.3	77.6	232.86	37.28
2016/17	188,253.15	8,071.75	260.32	119.1	1,357.10	776.5	155.3	336.42	232.86	37.28
2017/18										

Source: CFS, (2014 – 2017)

4.3 Fertilizer Market Structure

Like most SSA countries, Zambia depends on the international markets for its fertilizers, as local production is very limited and dependent on a state-run plant (Nitrogen Chemicals of Zambia [NCZ] that is in need of major repairs/upgrades. There is some local blending by Zambian Fertilizers Ltd. and others. There has been considerable interest, with some efforts by several governments in SSA to encourage local or regional manufacturing in hopes of improving accessibility and productivity, while saving on foreign exchange and avoiding international price fluctuations. However, efforts in this area have not been successful due to a combination of factors, including the lack of detailed feasibility studies, resource limitations, insufficient regional demand to warrant investments and competition from relatively cheaper products from the Middle East and other sources (Gregory and Bumb, 2006). Though the market is a mix of public and private sector players, the state influences a number of processes along the value chain through the implementation of the Farmer Input Support Programme, or FISP.

4.4 Fertilizer Distribution Channel

In Zambia, the fertilizer distribution channel is largely dominated by the Government through the subsidy program, FISP. Under FISP, fertilizer is distributed through district-level government authorities to members of independent farmer co-operatives. Many of these co-operatives have a decades-long history, whereas others were established more recently, sometimes for the purpose of gaining access to FISP inputs. In some cases, co-operatives not specifically involved with maize production, such as dairy marketing groups or associations of vegetable producers, have also benefitted from FISP inputs, since their members also grow maize. Historically, the FISP and its precursor, the Fertilizer Support Program (FSP), have had a poor record of delivering inputs on time. In a typical year of operation, Government begins in-house negotiations of the procurement and distribution program modalities in March. These negotiations go on until August. Government approves the modalities in August and a tender document for fertilizer procurement is subsequently prepared and advertised in September. By October, contracts are awarded for the supply of fertilizer, but the process is delayed by the finalization of funding arrangements which happens in November. Once funding is approved by banks, letters of credit are established, and fertilizer is procured and distribution begins in December. Distribution of government fertilizer continues until February. This timeline is significantly behind the crop production schedule of farmers which begins in October.

Annually, the procurement of fertilizer is handled by the government through an open tender. Despite these competitive arrangements, all fertilizer contracts have been awarded to the same three companies since the program's inception, namely to the state-owned manufacturer (Nitrogen Chemicals of Zambia), Omnia Small Scale Limited, and Nyiombo Investments Limited. Program administrators have reported that the main reason for this outcome is that the other fertilizer companies were judged to lack the physical capacity to deliver the required volumes and/or could not mobilize the necessary finances. Unsurprisingly, the awarding of fertilizer contracts to the same private companies each year has led to complaints by firms excluded from the program. Some companies have said that the tender specifications were designed specifically to prevent them from winning a contract. One such rule, for example, has been the requirement to supply granular (composite) fertilizer that is produced only overseas rather than blended fertilizer, which is manufactured locally from imported ingredients. Another requirement has been that suppliers had to have 50 percent of the fertilizer tendered for already in the country at the time of making their bid, which is impractical for small firms or indeed for any company that is not very certain of winning the government contract. Both rules on fertilizer procurement have since been dropped from the tender.

It has been estimated that in recent years, FISP has accounted for more than 95 percent of fertilizer supplied to smallholder farmers. The range of fertilizers distributed under the government program is very narrow (mostly Urea and Compound D). Soil tests conducted in several locations in the country show that the availability of P, K and S is not uniform and for a crop, such as, maize, the supplementary nutrient requirements will be different. These differences in nutrient deficiency implies that fertilizer products have to be distributed with regard to differences in soil conditions. In soil fertility evaluations, it is recognized that the application of soil amendments is site specific because of differences in soil properties.

Regarding the distribution of nonsubsidized (private) fertilizer, some fertilizer importers have their own licensed agents in major towns and well-established farm areas. Large commercial farmers typically place advance orders directly with the importer or an agent in their area. In some cases, very large agricultural producers may even import their own fertilizer. At least one private company specializes in producing custom-blended fertilizer specifically formulated for each individual client's soil types.

The number of importers who are also involved in wholesaling and distribution in Zambia is estimated at 13 and includes the following: Nitrogen Chemical of Zambia (government manufacturing plant near Lusaka), Greenbelt Ltd. (also trades and blends in Tanzania and Mozambique), Zambia Fertilizers Ltd. (does blends also), Bridgeways Commodities, Pro-vet, Nyiombo (Zambia-based), Omnia Ltd., Louis Dreyfus and Export Trading Group (ETG). Most of these companies are headquartered in South Africa. Some of the factors that limit entry include the small size of the market considering the competition from subsidies, financial requirements and logistics and management constraints in handling bulky products.

4.5 Fertilizer Policies and Regulations

The agricultural sector is guided by the National Agricultural Policy which undergoes periodic reviews to ensure its relevance to prevailing climatic, social and economic conditions of the country. In addition, the sector has a number of pieces of legislation some of which are outdated. A process has been initiated in the recent past to repeal, review, amend and enact new legislation aimed at providing a legal framework that will maximize sector development and growth.

The Agriculture (Fertilizers and Feeds) Act of 1970 is the Act in effect to provide for the regulation and control of the manufacture, processing, importation and sale of agricultural fertilizers and farm feed; to provide for minimum standards of effectiveness and purity of such fertilizers and feed; and to provide for matters incidental to or connected with the foregoing.

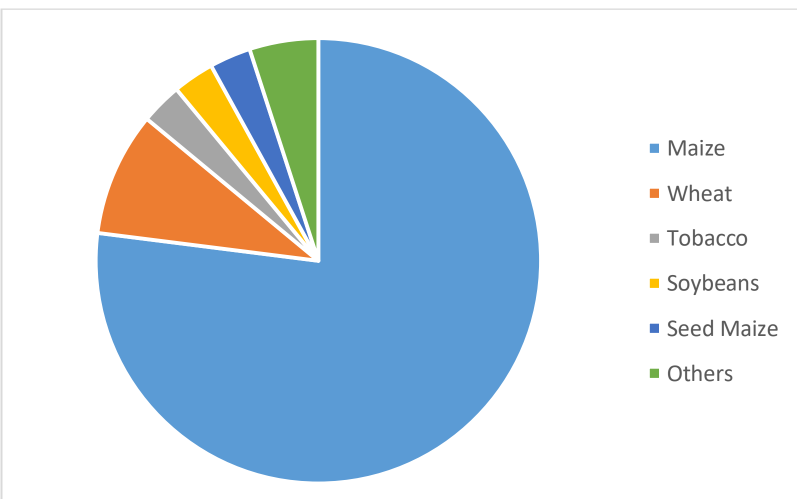
Fertilizers, being chemical in nature have the potential to cause pollution and therefore, also fall under the Environmental Protection and Pollution Control Act, an Act that provides for the protection of the environment and the control of pollution in the country. Under this act all fertilizer material in use in the country have to be registered with the Zambia Environmental Management Agency (ZEMA) who are the custodians of the Act.

There are various government agencies that enforce these regulations, including Zambia Bureau of Standards, Zambia Compulsory Standards Agency, Zambia Agriculture Research Institute, Competition and Consumer Protection Commission of Zambia, and the Zambia Environmental Management Agency.

5. Fertilization: Use, recommended rates and farmer practices

Fertilizer use in Zambia has increased from 236,372 tons in 2009/10 to 361,095 tons in 2016/17. In terms of the total quantity available, most of the fertilizer (77 percent) is applied to maize. This practice contrasts with practices in some other countries in Africa, where fertilizer is used mainly for export cash crops. When the total quantity, however, is disaggregated by fertilizer use by small-scale farmers (SSFs) and large-scale farmers (LSFs), it is interesting to note that LSFs use higher quantities of fertilizer (72 percent) on “other crops,” while SSFs use 93 percent of available fertilizer on “maize.”

Figure 5. 1: Fertilizer Use by Type of Crop (% Total)



Source: Ministry of Agriculture

Zambia has considerable amounts of data on the amounts of fertilizer used. The Ministry of Agriculture and Livestock’s Early Warning Unit (MAL/EWU) collects data annually on total fertilizer use in the small-scale and large-scale farm sectors for 20 individual crops. It is generally accepted that the MoA/EWU data understate commercial fertilizer use, however these data still provide a reasonable picture of overall demand trends. Other crops covered by the MoA/EWU include barley, Bambara nuts, cotton, cowpeas, groundnuts, maize for silage, mixed beans, paprika, popcorn, rice, sorghum, soybeans, sunflower, and sweet potato (see Appendix for details).

Fertilizer application rates for all crops based on area planted for 2 seasons (2016/17 and 2017/18) are shown in Table 5.1 below. In terms of ABI indicator on fertilizer application rate, which measures the ratio of total fertilizer use to total arable land, the average fertilizer application rate in Zambia for 2017/18 is about 90 kg/ha. This rate is much higher than rates in many African countries and surpasses the target specified in the Abuja Declaration on fertilizer use (50 kg/ha). Further details for individual crops are given in Appendix.

Table 5. 1: Aggregated Fertilizer Application Rates for Small-Scale and Large-Scale Farmers (2016/17 and 2017/18)

	Total Ha Planted	Total Fertilizer Used (MT)			Fertilizer Used (ton/ha)		
		Basal	Top	Total	Basal	Top	Total
Large Scale							
2016/17	158912	38055	30164	68219	0.24	0.19	0.43
2017/18	149138	30758	20797	51555	0.21	0.14	0.35
Small Scale							
2016/17	2558764	149268	143608	292876	0.06	0.06	0.11
2017/18	2298309	102795	106438	209233	0.04	0.05	0.09
Total							
2016/17	2717676	187323	173772	361095	0.07	0.06	0.13
2017/18	2447447	133553	127235	260788	0.05	0.05	0.11

Source: Calculated from CFS Data

Fertilizer application rates are often understood in 50-kilogram bag basal application x 50-kilogram bag top dressing per hectare, this is especially so with small scale farmers. It is worth noting that FISP is designed to provide small-scale farmers enough fertilizer to use on maize at the rate of 4x4 50-kilogram bags (200 kg basal dressing, 200 kg top dressing) per hectare. Actual application rates by small-scale farmers are much less than these amounts. In large part, this is because the data are based on total area planted, including area planted with new hybrid and other types of seed. There is also a known tendency for small farmers to share FISP input packs and to apply the fertilizer more thinly than recommended. Small scale farmers also tend to extend this blanket recommendation to almost all crops. The 4x4 recommendation, in fact, is a yield maximizing recommendation and has not changed since the period before liberalization, so it is not based on the potential returns to fertilizer at prevailing prices. In this regard, concern has been raised by some stake holders about the blanket use of Compound D (10:20:10) as basal fertilizer under FISP, stating that this product is not well suited to many soil types in Zambia. In some high-rainfall areas, for example, soils are known to be very acidic and would benefit much more from lime than Compound D.

Table 5. 2: Fertilizer Application Rates for Selected Crops (50-kg bag/ha)

Crop	2017/18 (50 kg bags/ha)			
	Large Scale		Small Scale	
	Basal	Top	Basal	Top
Maize Grain	4.09	4.19	1.44	1.52
Maize Seed	7.41	7.16	0	0
Wheat	6.55	6.49	0	0
Tobacco	7.07	1.72	5.66	4.54
Soya Beans	3.11	0.61	3.34	0.63

Source: Calculated from CFS Data

Table 5. 3: Recommended Application Rates (Kg Nutrient/Ha) for Major Crops in Zambia

Crop	Recommended Application Rate (Kg Nutrient/Ha)		
	N	P_2O_5	K_2O
Maize	112	40	20
Maize for seed	20	40	20
Maize for silage	66	40	20
Green Maize	66	40	20
Sorghum	66	40	20
Rice	112	40	20
Millet	112	40	20
Sunflower	112	40	20
Groundnuts	66	40	20
Soybeans	112	40	20
Seed cotton	66	40	20
Irish potatoes	186	184	162
Virginia Tobacco	22	76	44
Burley Tobacco	22	76	44
Mixed beans	20	40	20
Bambara nuts	20	40	20
Cowpeas	86	40	20
Sweet Potatoes	20	40	20
Paprika	86	40	20
Wheat	86	40	20
Barley	178	53	53
Popcorn	112	40	20

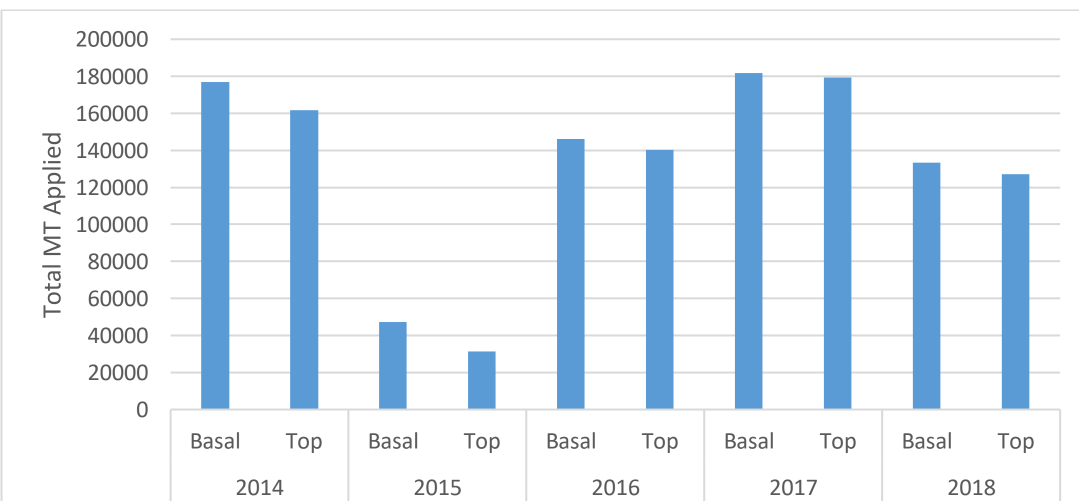
Source: MoA

Table 5. 4: Fertilizer Consumption by Product in MT 2014 - 2018

Crop	Volumes of Fertilizer Applied (MT)									
	2014		2015		2016		2017		2018	
	Basal	Top	Basal	Top	Basal	Top	Basa	Top	Basal	Top
Maize	138143	140578	8963	8804	120543	122351	149712	157365	104735	109940
Maize for seed	2182	2250	3009	3061	2133	2189	2175	7370	3082	2979
Maize for silage	500	453	929	812	958	1013	726	632	373	349
Green Maize	132	128	39	31	48	48	78	67	58	42
Sorghum	217	102	67	57	92	66	91	58	33	28
Rice	104	82	311	231	34	27	63	49	150	84
Millet	60	58	81	83	25	11	36	19	70	53
Sunflower	200	185	102	50	118	61	96	27	391	236
Groundnuts	108	102	135	81	128	73	93	75	93	71
Soybeans	14986.58	1562	14272	2327	10701	4442	14753	3914	11323	2233
Seed cotton	625	512	200	63	454	269	743	211	287	130
Irish potatoes	872	566	1280	758	97	81	612	235	572	497
Virginia Tobacco	6052	2098	4356	1335	1415	737	2120	788	2010	699
Burley Tobacco	1764	1501	1387	1149	1375	1194	1727	1223	2220	1997
Mixed beans	193	196	180	106	269	65	113	66	15	5
Bambara nuts	2	2	0	0	0	0	6	6	0	0
Cowpeas	16	75	53	39	56	52	13	6	16	5
Sweet Potatoes	80	55	160	90	178	131	152	40	103	67
Paprika	48	26	4	1	2	0	0	0	9	0
Wheat	10107	10573	11364	11903	7146	6796	7727	6717	7115	7041
Barley	416	313	174	95	121	72	223	157	301	310
Popcorn	201	237	230	291	356	550	401	328	367	396
TOTALS	**177008.6**	**161654**	**47296**	**31367**	**146249**	**140228**	**181660**	**179353**	**133323**	**127162**

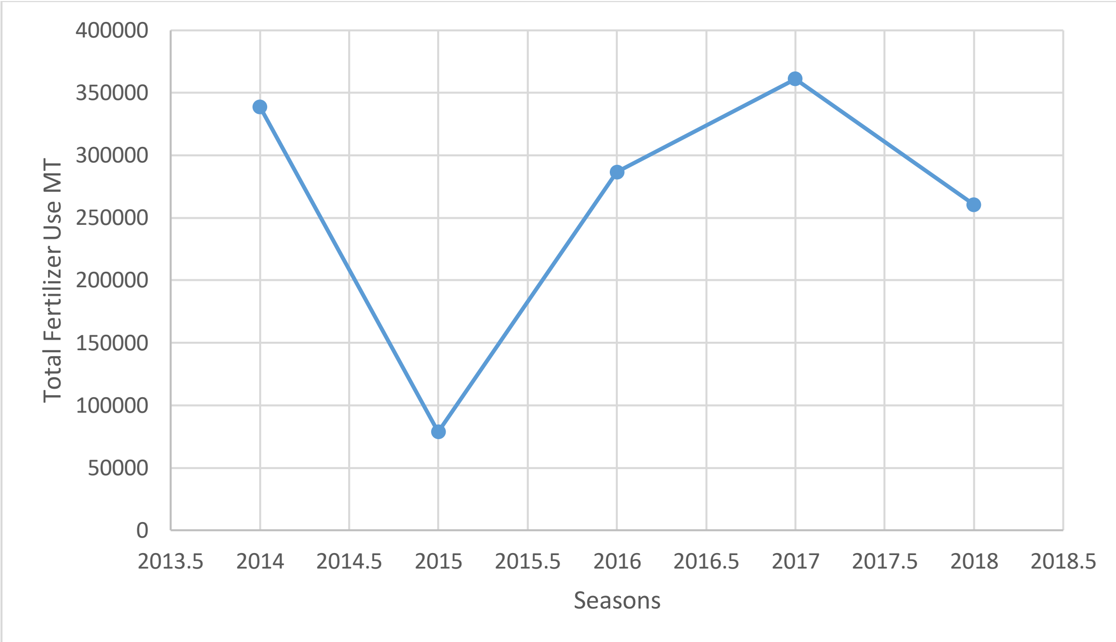
Source: CFS Data

Figure 5. 2: Summary of Fertilizer Consumption by Product in MT 2014 - 2018



Source: Calculated from CFS Data

Figure 5. 3: Total Fertilizer Use MT 2014 - 2018



Source: Calculated from CFS Data

Table 5. 5: Percentage Change in Total Fertilizer Use MT 2014 - 2018

Season	Fertilizer Use MT	% Change
2018	260485	-27.85
2017	361013	26.02
2016	286477	264.18
2015	78663	-76.77
2014	338663	

Source: Calculated from CFS Data

Appendices

6.Challenges of the study

The collection and collation of data for this study was not without any challenges. Chief among these challenges are the following:

1. Reluctance of key industry personnel, especially private fertilizer companies, to release data on fertilizer production (blending) and distribution. There is apparently a lot of tax evasion and avoidance by importers and blenders and as such they are not very willing to divulge information on their products.

2. The National wide Crop Forecast Survey conducted by the Ministry of Agriculture in conjunction with the Central Statistics Office is not very conclusive because it categorizes fertilizers into only basal and top dressing. It is therefore impossible to estimate fertilizer use by crop by nutrient for the country.

3. The scope of this study is very limited because it relies heavily on secondary data from past studies and surveys.

7.Recommendations

In view of the above it is recommended that key stake holders in the fertilizer value chain are brought together and sensitized on the importance of providing data on fertilizer before undertaking such a study as this.

To fully appreciate fertilizer, use by crop in Zambia it is necessary to conduct a much larger study that will aim to collect much more detailed information on fertilizer use by farmers.