AfricaFertilizer.org

REVIEW OF FERTILIZER USE BY CROP IN ZIMBABWE

2019 EDITION

FINAL DRAFT

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1.0 Introduction

1.1 Background of the Study

In 2013, as part of AfricaFertilizer.org (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 were conducted in Cote d'Ivoire, Ghana, and Nigeria in West Africa; and Ethiopia, Kenya, Mozambique, Tanzania and Uganda in Eastern and Southern Africa. This study is a continuation of collection of data and information on FUBC in Zimbabwe from 2014 to 2018.

Agriculture occupies a central place in the Zimbabwean economy for employment, incomes and poverty reduction. It contributes 15-18 percent of Gross Domestic Product (GDP), 23 percent to the total formal employment, and provides livelihoods to approximately 70 percent of the rural population. It also supplies about 63 percent of industrial raw materials with the share of agriculture in manufacturing value added at 60 percent, and the share in export earnings at 30 percent. Agriculture-related employment supports a third of the formal labour force (source NAPF 2019). As a result of this importance to agriculture, trending of FUBC is key to Zimbabwe as it is very critical for overall economic growth and the achievement of the millennium development goals that includes poverty reduction.

1.2 Purpose of Study

The purpose of this study is to assist IFDC to collect and compile data and information related to fertilizer demand and supply in Zimbabwe. The study will help update the Fertilizer consumption statistics and report on National consumption and Fertilizer Use by Crop (FUBC) for Zimbabwe for the periods 2014/15 to 2016/17

The FUBC data provides understanding on what the actual application rates (based on land cultivated) and volumes (by product) consumed by farmers are for Zimbabwe. 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.

2.0 Methodological Framework

2.1. Secondary Data

Secondary data was collected from the Ministry of Lands, Agricultural, Water, Climate and Rural resettlement (MLAWCRR). The Ministry produces at least two crop assessment reports per year. The crop assessment reports give detail of crops grown and the hectarages put under the different crops by province. They track hectarages and yields. The MLAWCRR also produces in agricultural bulletin that gives information on agriculture. A 2017 bulletin was available and had summaries of crop

production by area. Yield and province dating to as far back as 1986 for some crops. On the crop assessment surveys, officers are supposed to collect data on actual fertilizer use through the extension officers but fertilizer use data was missing and was not readily available and could not be secured for the purposes of this study. This would have been the best source to allocate fertilizer to the actual crops. Assumptions had to be made in apportioning fertilizers to crops especially on Ammonium Nitrate which is normally just lumped together.

Zimstats data could also have been used as a source of secondary data but the only problem was that data was not up to date. Information loaded was up to year 2012 sometimes 2013 and very little data had been uploaded for year 2014. This data could therefore not be used as it did not quite cover the period of study. The Agricultural marketing authority, AMA was also approached and provided secondary data that was used in the study.

Secondary data was also collected from other sources such as publications on fertilizer consumption by year from IFDC and its partners like AFAP. The available data only went to as far back as 2015 and hence some years were not covered. Argus reports and FAO reports were also used in compiling secondary data for the study.

2.2 Primary Data

Primary data was collected from the fertilizer manufactures who are also the distributors. Tables to complete, with the required data were send out for completion by the suppliers. One of the companies however was not comfortable in providing the data and market intelligence data had to be sued to fill in the gaps. The trade data collected form the manufacturers and distributors and the one on one interviews done with key people was used to clean up the secondary data that had been compiled. Estates were also approached, and data collected on fertilizer use statistics.

For Tobacco, the Tobacco Industry and Marketing Board (TIMB)was approached and used for collection of data on tobacco production. The TINM had very detailed and well organised data on number of growers, hectarages grown, average yields, production data and pricing information. However, they di not collect data on fertilizer use. Is this information had been available form this source, it would also have helped clean out the usage data on tobacco.

2.3 Constraints and Limitations on the data and Information Available

Although the available trade data seemed to be accurate, the difficulty was in apportioning products to crops. For example, 7:14:7 +*Sulphur is a cereal fertilizer that goes into both maize and wheat but from the total sales/distribution figures given, it was difficult to know how much of that went into wheat and how much went into maize. As a result of the small tonnage of wheat that was being produced, an assumption was made to make the fertilizer into that crop insignificant so that the assumption was that all that fertilizer went into maize. The same applies for tobacco compounds or basal fertilizers. These are also used in the production of Irish potatoes but again because of the quantum differentials, the application into potatoes was ignored. This will therefore automatically introduce errors into the consumption figures and will result in computation of consumption figures that may be higher than actuals.

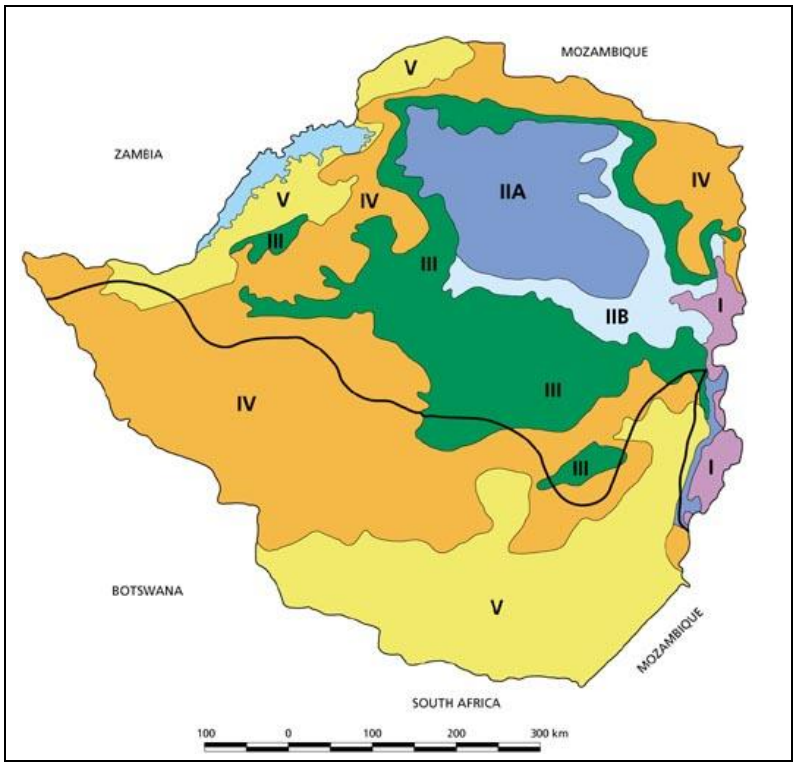
There were gaps in the data collected and certain assumptions had to be made int the computations. For example, it was not possible to get fertilizers data into the out-growers for sugarcane, tea and coffee. These hectarages were then left out of the computations as data of both

areas planted and fertilizer use was not readily available. The computed figures would therefore be much higher than the national averages since the out-growers would most likely apply less because of financial constraints. They also have limited borrowing capabilities because of the land tenure issues which have seen banks shying away from using land as collateral for money borrowed.

3.0 Overview of Agriculture in Zimbabwe

3.1 Agro-ecological zones

Figure 3. 1 Zimbabwe Agro-ecological Zones



Source Moyo, 2000: Vincent and Thomas,1961

Zimbabwe is divided into five agro-ecological regions, also referred to as natural farming regions, (Fig 1). Classification of the regions is based on rainfall regime, temperature, the quantity and variability of average rainfall, vegetation type as well as soil quality. The table below summarises the main characteristics of the farming regions.

Table 3. 1 Zimbabwe Agro-Ecological Regions

Natural Region	Province Spread	Ave. Rainfall (mm)	% Total Land	Characteristics	Agricultural Activity
I	Manicaland	> 1050	2	High rainfall, specialized and diversified	Forestry, tea, coffee, fruit, intensive livestock
II	Mashonaland Central, Mashonaland East, Mashonaland West, Manicaland, Harare	750 – 1000	15	High rainfall	Maize, flue cured tobacco, cotton, sugar beans, horticulture, intensive animal husbandry, coffee, irrigated wheat and barley, sorghum, groundnuts

III	Manicaland, Midlands	680 – 800	19	Periodic droughts, unreliable start to rain season, mid - term dry spells	Semi intensive farming, extensive beef ranching, marginal maize, millet, sorghum
IV	Masvingo, Matebeleland South, Matebeleland North, Manicaland, Midlands, Bulawayo	450 – 650	37	Too dry for successful crop production without irrigation, prolonged mid - term dry spells	Marginal millet, sorghum, extensive beef ranching, game ranching
V	Masvingo, Matebeland South, Manicaland, Bulawayo	< 450	27	Too dry for successful crop production without irrigation, prolonged mid - term dry spells	Marginal millet, sorghum, extensive beef ranching, game ranching

Natural Region I

This region is in the east of the country covering areas in Manicaland. The region receives rainfall of more than 1 050 mm/year which falls throughout the year. It is characterised by low temperatures, high altitude and steep slopes. There is extensive timber production in the plantations owned mainly by the State through the Forestry Commission and by multinationals. There are several small owner-operated plantations and sawmills. NR I is ideally suitable for intensive diversified agriculture and livestock production, mainly dairy farming. Common crops grown in Region 1 are tropical crops such as coffee and tea, deciduous fruits, such as bananas and apples, and horticultural crops, such as potatoes, peas and other vegetables. Flowers, such as proteas *(Proteaceae* spp.) used to be grown for export.

Natural Region II

This region is located in the middle of the north of the country as shown in Figure 1. The rainfall ranges from 750 to 1 000 mm/year. Rainfall is fairly reliable and falls from November to March/April. As a result of the reliable rainfall and good soils, region 2 is suitable for intensive cropping and livestock production. It accounts for 75-80 percent of the area planted to crops in Zimbabwe. Typical crops grown are flue-cured tobacco, maize, cotton, wheat, soybeans, sorghum, groundnuts, seed maize and burley tobacco grown under dryland production as well as with supplementary irrigation in the wet months. Irrigated crops include wheat and barley grown in the colder and drier months (May-September). Intensive livestock production is also dominant and based on pastures and pen-fattening utilizing crop residues and grain. Prior to 2000, the region was dominated by the large-scale farming subsector characterized by highly mechanized farms of 1 000-2 000 ha under freehold title and owner operated. Following the agrarian and land reform programmes initiated in 1999/2000 farm holding has changed as will be detailed in sections above.

Natural Region III

NR III is located mainly in the mid-altitude areas of the country. Annual rainfall of 500-750 mm is received with typical mid-season dry spells and high temperatures. Agriculture in this region is of drought-tolerant crops and semi-intensive livestock farming based on fodder crops. The predominant farming system is smallholder agriculture. Large-scale farming accounts for 15 percent of the arable land production, with most of the land being used for extensive beef ranching (Roth, 1990).

Smallholder agriculture in the communal farming areas is under relatively intensive cropping systems. The main crops grown are maize (the staple food) with cotton as the major cash crop. The region is also suitable for the production of groundnuts and sunflowers as cash crops.

Natural Region IV

Natural region IV is located in the low-lying areas in the north and south of the Zimbabwe. The region is characterised by annual rainfall of 450-650 mm, severe rainy season dry spells and frequent seasonal droughts. NR IV is unsuitable for dryland cropping however, smallholder farmers grow drought-tolerant varieties of maize, sorghum, pearl millet *(mhunga)* and finger millet *(rapoko).* NR IV is suitable for cattle production under extensive production systems and for wildlife production.

Natural Region V

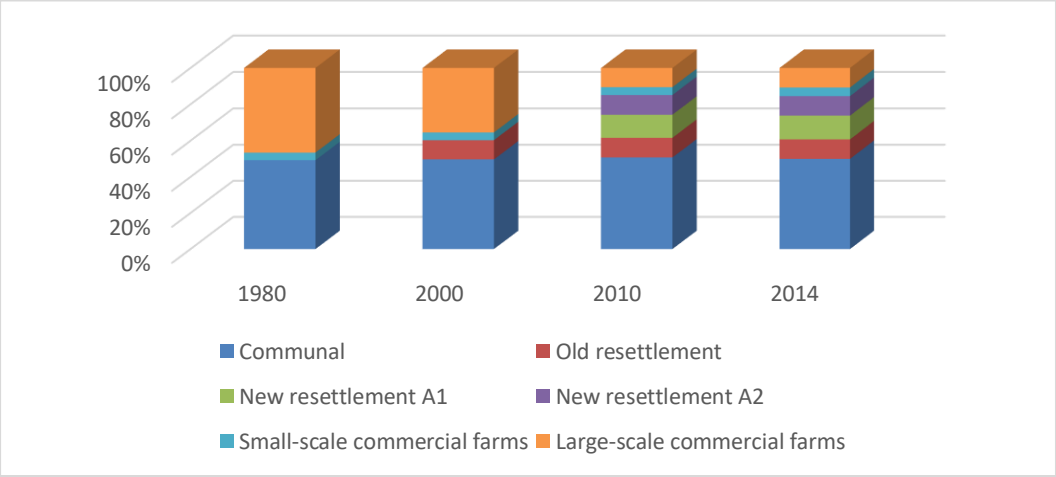
Region V covers the lowland areas that lie below 900 m above sea level in both the north and south of the country. The rainfall is highly erratic and falls below 650 mm/year. Reasonable amounts of rainfall are received in some parts of Region V, in the northern part of Zimbabwe along the Zambezi River. However, its uneven topography and poor soils make it unsuitable for crop production. Region V is suitable for extensive cattle production and game-ranching.

Although both Regions IV and V are too dry for crop production, households in the communal lands in these regions grow grain crops (maize and millet) for their food security and some cash crops such as cotton. Crop yields are extremely low and the risk of crop failure is high. Cattle and goat production are major sources of cash income in these regions

3.2 Farmer Profiles

The agricultural sector in Zimbabwe has undergone fundamental transformation in the structure of land ownership, access to and use of rural agricultural land as a result of the fast-track national land reform and resettlement programme. At independence in 1980, over 15million hectares of land was devoted to large scale commercial farming and owned by 6000 farmers nearly all of them white. By 1999, the land under the white commercial farmers fell to around 12m through a land resettlement program funded by the British Government under provisions of the Lancaster house agreement. However, the nation's agrarian structure underwent radical change in 2000, under the Fast Track Land Reform Program. Under this program over 4500 farms making up 7.6million hectares were reallocated. The size of large-scale commercial farms was reduced and allocated to 145,000 new A1 and 18,000 new A2 farmers, adding to the existing communal and old resettled farmers, to bring the total number of smallholders to about 1.3 million. The number of large-scale farmers was reduced to 4500 from 6,000. Figure 3.2 below is a bar graph of the Farm type distribution by year for Zimbabwe.

Figure 3. 2 Zimbabwe farm size distribution by year



Source: Ian Scoones et al, 2010, MLACRR, 2015

Table 3.2 below shows the hectarages and shifts in farm size distribution from 1980 through to 2014 and the percentage of total area for 2014. What is striking again is the increase in land under communal/ resettlement and A1 farms. This parcelling of land saw an increase in small holder farming which loses the economies of scale advantage.

Table 3. 2 Changes in the National Distribution of Land, 1980-2014

Land Category	1980	2000	2014	2014
	Area (million ha)	Area (million ha)	Area (million ha)	Area (%of total)
Communal areas	16.4	16.4	16.400	42
Old Resettlement	0.0	3.5	3.500	9
New Resettlement A1	0.0	0.0	4.137	11
New Resettlement A2	0.0	0.0	3.497	9
Small Scale commercial	1.4	1.4	1.400	4
Large scale commercial	15.5	11.7	3.383	9
Corporate & State farms	0.5	0.7	0.721	2
Urban land	0.2	0.25	0.250	1
National parks and Forest land	5.1	5.1	5.074	13
Unallocated	0.0	0.0	0.708	2

Source, MLACRR 2015 & Africa Institute of Agrarian Studies

Zimbabwe's agricultural sector therefore remains predominantly smallholder-led with over a million communal farmers relying on rain-fed agriculture, and close to 70 percent of them making a livelihood on less than 2 hectares (Ha).

3.4 Main Crops to be studied

Zimbabwe's main agricultural crops include maize, sorghum, millet, wheat, cotton, tobacco, soyabean, tea and coffee, sugarcane, peanuts and livestock. Tobacco, sugarcane, cotton and maize contribute most to exports. Tobacco contributes 25% to GDP while cotton contributes 12.5% (before the fall in lint prices on the world market).

Other "minor crops" such as legumes (Bambara, round nuts and ground nuts), tubers (potato ad sweet potatoes), beans and leafy green vegetables (such cabbages) are grown across the country mainly by smallholder farmers.

This study will cover maize as the main food crop mainly because although significant volumes of millet and sorghum are grown especially in the dry areas, very little fertilizer is applied in these crops. On the cash crops front, tobacco, cotton, sugarcane and tea and coffee will be covered as they use significant volumes of fertilizer and are important as export products for Zimbabwe.

The production data and statistics for each of these crops is looked at in detail in chapter five below.

3.5 Crop Calendar of Main Crops

Zimbabwe's climatic conditions are the primary driver of most agricultural enterprises. The country lies above the Tropic of Capricorn but generally experiences sub-tropical conditions because of its high average elevation. The country experiences a unimodal rainfall season, which generally starts from October to the end of March. A short dry weather season occurs from the end of April to around August. Commercial farm set-ups tend to exploit these conditions to grow different crops throughout the year. However, for most of the country the rainfall season is the main production season for most crop enterprises. The main crops grown in Zimbabwe are maize, tobacco, soyabean, cotton and these are confined to the rain season, wheat and barley are grown in the winter months. Various other small crops are also grown. Several plantation crops are also produced in the country as indicated earlier and these include, sugarcane, citrus, tea, macademia, coffee, tea, avocado, banana among many others. The crop calendar for the main season crops is indicated below.

Figure 3. 3 Zimbabwe crop calendar

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Crop												
Maize												
Tobacco												
Cotton												
Soyabean												
Wheat												
Barley												
Sugar cane												

Key

Green: Planting operations, basal fertilizer applications
Grey: General crop management operations, including top dressings
Yellow: Harvesting and other post-harvest operations
Brown: Soil sampling, land preparation, input procurement.

4.0 The Fertilizer Sector in Zimbabwe

4.1 Structure and Distribution of the Fertilizer market In Zimbabwe

The Zimbabwean Fertilizer value chain has two primary producers, namely Chemplex corporation, with ZimPhos being the fertilizer arm and Sable Chemicals. ZimPhos has a mine based in Dorowa where rock phosphate is mined and concentrated to around 37.5% P205. ZimPhos has an acid plant that produces sulphuric acid through burning of sulphur. All the sulphur is imported. The sulphuric acid is reacted with the acid to produce Single Superphosphate (SSP-20% P205) which is then sold to Windmill and ZFC Limited and used in the granulation of NPK compounds. Currently the acid plant in ZimPhos is down and all acid is currently being imported.

Sable Chemicals produces Ammonium Nitrate. It used to produce ammonia from the Electrolysis method, but this plant has since been shut down because it was not economical to run due to high consumption of electricity. Currently Sable is therefore importing its ammonia from Sasol and then converts this to ammonia Nitrate in its plant. Given enough ammonia, the plant has the capacity to produce 260 000 metric tonnes of Ammonium Nitrate per annum.

Windmill and ZFC Limited have steam granulation plants that have combined granulation capacity of 360 000mt per annum. The NPK compounds are then produced using phosphate from ZimPhos and the Ammonium Nitrate from Sable Chemicals. All the potash requirements are imported. As a result of the limitations with the primary producers cited above, part of the phosphate requirements and the ammonium nitrate requirements also have to be imported to augment production from ZimPhos and Sable Chemicals. For high analysis requirements, ZimPhos used to produce Triple Superphosphate (TSP-45% P205) and had a phosphoric acid plant which again has been shut down. Currently all high concentration phosphate raw materials are being imported. ZFC and Windmill distribute their fertilizers directly to farmers and through a combination of own depots and agro-dealer networks that are dotted across the country. They also distribute through large retail groups like OK Zimbabwe, Farm and City, TM and Pick n Pay and National Tested Seeds. ZFC Limited and Windmill also supply product into government schemes. The Government in turn distributes the product through Grain Marketing Board depots that cover the whole country.

Zimbabwe also has a number of blenders and companies that manufacture and distribute blends across the nation. ZFC Limited has a 50mtph blender in Harare, FSG has 4 by 30mtph EMT Blenders based in Bindura, ETG has a 50mtph Blender in Harare, Omnia Zimbabwe has a 20mtph blender in Banket and last but least Grow Agriculture has a 20mtph blender in Harare as well. Distribution of product is again directly to farmers, or through the same channels as those for the compound fertilizers that are used by ZFC Limited and Windmill.

4.2: Research and Extension Services in Zimbabwe

Zimbabwe has a pluralistic extension services system which has both private and public sector players. The main actors are

- **The Agriculture, Technical ad Extension Services (Agritex)**

  The department falls under the Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement (MoLAWCRR). It is mainly funded by government through salaries of the extension workers. It is the principal agriculture extension agency in Zimbabwe. Agritex provides general extension services and training to farmers particularly those with limited resources by assisting them to solve their own problems and to impart knowledge and awareness to increase agricultural productivity. The approach used is mainly the group approach using such tools as field days, demonstrations plots (roadside and inland demos) strip trials as well as side by side control and experimental demo plots. One on one approaches are also used but to a lesser extend because of limited resources.

  The structure of Agritex starts at the ward level. Typically, a ward has about 3 extension workers who report to a zone supervisor. The zone supervisor is in charge of about 3 wards. The zones grouped into 7 zone units are managed by a supervisor. These supervisors report to the district Agritex Extension Officer. A district normally has about 20-25 wards. The District Agritex Officer (DAO) works with an agronomist (called a specialist) and a Human resources officer. The District Agritex officer reports to a Provincial Agritex Officer (PAO) who in turn reports to a National Director. The National director reports to a Principal Director (PD). The PD reports to the Permanent secretary.

- **Department of Research and Specialist Services (DR&SS)**

  The DS&SS falls within the MoLAWCRR and is responsible for carrying out agricultural Research. The mandate of DR&SS is conducting of research and generating technologies to increase agricultural productivity. Funding is by government through salaries and funding of general operating costs. Donor funding comes only on specific/ targeted research and extension programs.

  Currently the DR &SS department comprises of three main research divisions namely, The Livestock Division, The Crop Breeding Division and the Specialist Services division. The Specialist Services division is further divided into 8 institutes namely; Farm Feeds and Remedies (FFRI), Plant quarantine Services, Seed Services, The Plant protection Services, the Chemistry and Soil analysis institute, the Gene bank institute, Natural Herbarium and Botanical gardens, and the Biometrics Institute which provides data analysis support to the other seven institutes listed above. A farming Systems Research unit used to be housed under DR & SS. There are other research institutions that fall under the Ministry but outside the DR&SS namely the Tobacco Research Board and the Pig Industry Board.

- **Department of Veterinary Services (DVS)**

  The DVS, again funded by Government, is responsible for implementing and managing the nationwide Livestock Herd Health Management Programme. This involves monitoring and controlling animal diseases through research, enforcing regulations, vaccinations, treatments, dipping, and veterinary extension.

- **Development Partners e.g. FAO, AFDB and WFP**
  These come in to run and fund specific/targeted programs or provide funding for the other extension services providers.

- **NGOs such as CARE and Catholic Development Agency**.
  These operate in selected communities and provide extension services in their targeted areas with the humanitarian aim of improving livelihoods especially in poor and marginalized communities.

- **Farmer Unions**
  These include the Commercial Farmers Union (CFU) comprising of large scale commercial farmers, The Zimbabwe Farmers Union (ZFU) which taps its membership from Small holder farmers, A1 farmers, resettlement and communal farmers, the Zimbabwe Commercial farmers union (ZCFU) and the Zimbabwe National farmers Union (ZNFU) which both tap members from the A2 farmers.
  Members voluntarily join the farmer unions. Unions are funded from members subscriptions and from legislative commodity levies. The mandate is to represent the farmer groupings politically, economically, and from a technical perspective. Farmer unions have a secretariat and also employ a technical team consisting of an agronomist, an entomologist, a plant pathologist, a soils expert and a marketing specialist. These are then responsible for the provision of extension services normally in response to specific individual or group requests.
  The Agritex sometimes uses these groupings to reach out to farmers and group them for their own training programs.

- **Private sector players**
  Private sector players mainly comprise of agricultural input suppliers that include fertilizers companies, seed companies, irrigation and other equipment companies and chemical companies; and agriculture contracting syndicates such as PHI, Northern farming, Staywell and Zimbabwe Leaf tobacco (ZLT) to name a few.
  Agriculture input suppliers' motive will be to increase awareness and use of their products with the ultimate objective of increasing their sales and maximizing their profits.
  Contracting schemes main motive on the other hand is to protect their investment and make sure that farmers productivity is increased in order to enable them to pay back for inputs and provide enough raw materials for their other operating units. The farmers also need to be productive so that they get profits from their farmers and make the contracting schemes sustainable.

- **Other Extension Providers**
  Mobile network operators such as Econet through such provisions as Ecofarmer are providing extension services over the phone. Universities and Agricultural training colleges such as Gwebi, Chibero and BlackForby

4.3 Apparent consumption, Trend Analysis for 2014-2018

Table 4.1 below gives the consumption trend for fertilizers from the year 2014 to 2018 based mostly on trade data.

Table 4.1 Fertilizer consumption data from 2014-2018 based mainly on Trade data

PRODUCTS	2014	2015	2016	2017	2018
DAP					
Urea	6,150	5,000	20,000	65,100	46,300
Rock Phosphate					
CAN	2,500		6,000	2,200	3,200
SA	175				
SSP	17,500			4,500	3,400
MOP	6,100	13,500		500	400
SOP				300	350
TSP					
MAP				500	600
Ammonium Nitrate	81,350	130,500	170,000	148,000	120,000
Calcium Nitrate	2,000				
NPK					
20:10:10					
7:14:07	84,500	99,000	110,000	213,400	150,000
6:23:23			20,000	1,000	1,000
14:28:14			30,000	1,500	2,600
10:20:10:6S	3,500		3,000	10,000	15,000
12:10:08					
19:38:0+7S					
25:05:05				2,000	1,600
27:05:05					
5:18:10	4,500	5,000	5,500	55,000	48,000
17:17:17					
Gypsum	6,600			9,000	10,000
Potassium Nitrate	500			5,000	3,400
Speciality Blends	1,500			1,000	800
COFFEE					
14:5:20 +0.04B			1,000	5,000	3,400
TEA					
22:6:10+6S		4,000		5,000	4,000
25:05:10	3,000				1,000
25:05:05 +4S	300				
TOBACCO					
6:28:23				10,000	14,750
10:24:20			10,000	3,800	7,107
12:24:12					
15:8:18+6S					
5:15:12	29,650	35,000		57,000	40,000
6:15:12	1,000		30,000		
Organic Fertilizer					
Others	5,500	8,000	1,600	1,600	3,400
TOTAL	**256,325**	**300,000**	**407,100**	**600,300**	**479,307**

The information for the fertilizer usage was taken from other reports that include, the Argus reports, The IFDC AFAP reports, market intelligence information and production and sales data from those organisations that were willing to share the information for the purposes of the study. The sales data

collected was used for verifying and cleaning the data that had been obtained from the other secondary data sources.

4.4 Policies and regulations on Fertilizers

The regulatory framework for fertilizer products in Zimbabwe is mainly governed by the Fertilizer Farm Feeds and Remedies Act of 1953.

- The Fertilizer Farm Feeds and Remedies Act (Chapter 18.12) 1953, provides the legal framework for fertilizer production, trade and use in the country. The Act provides for the registration of fertilizers, farm feeds, sterilizing plants and certain remedies, to regulate and restrict the importation and sale of fertilizers, farm feeds and certain remedies and substances of animal origin intended for the manufacture of fertilizers or farm feeds and to provide for matters incidental to the foregoing. A number of statutory instruments for this act have also been enacted, the latest being the statutory instrument 144 of 2012 on pesticide regulations.
- The Environmental Management Act (Chapter 20:27) 2002 seeks to provide for the sustainable management of natural resources and protection of the environment, the prevention of pollution and environmental degradation, the preparation of the National Environmental Plan and other plans for the management and protection of the environment, the establishment of the Environmental Management Agency and an Environment Fund; to amend references to intensive conservation areas and committees and associated maters to various Acts.

Liberalisation of the economy, under the Economic structural adjustment programs in the 80s saw the removal of controlled fertilizer prices and subsidised fertilizer on the market. However, fertilizer import taxes remained effective ranging from 0-5%. That said several policy measures are also put in place by government from time to time that have implications on the fertilizer industry. Such measures include import restrictions, tariff measures and various other similar policy interventions that government puts in place.

- The most recent policy measure put in place by government sought to protect the local industry, including the fertilizer industry from competition from cheap imports that were flooding the market. The government enacted SI 64 of 2016 that saw the removal of 43 products from the Open General Import License. Duties were the levied on the importation of finished products to encourage people to bring in raw materials were there was capacity to produce locally. Fertilizer was among the identified products as the government sought to protect the local fertilizer industry. A duty of 25% was levied on importation of NPK blends and or fertilizers. Where there was a gap between local production and demand, such as was the case with top dressing, industry would bring in the deficit on a quota system. SI 64 of 2017 was superseded by SI 122 of 2017. Fertilizer remained on the list of items that were removed from this open general license.

5.0 Major crops analysis

5.1. Maize

The crop is the main staple crop for the country and is produced throughout the country including in the marginal areas frequently resulting in crop failure. Close to 2 million ha of land is put under the crop every season, however average yields have remained very low. The country's requirement for grain, both for human consumption and livestock stands at 2million tonnes. This requirement has been met on several occasions; however, this is largely dependent on the season quality. Successive droughts since the turn of the millennium have resulted in poor maize output whose average output per hectare has declined to below 1t/ha. This has resulted in shortages of grain at certain times of the year with government having to resort to importation from neighbouring countries. The Zimbabwe government in 2016, faced with an unsustainable import bill introduced the maize import substitution program, the Command Agriculture program to try and raise maize productivity to over 2million tonnes to enable enough grain to be produced in the country. The program, which is in its third season, has however produced mixed results. Main concerns are on the sustainability of the subsidy system as collection debts from inputs supplied to the farmers is weak and there are allegations of corrupt practices in input distribution and debt collection. On the positive side according to the Second Round Crop and Livestock Assessment Report of 2017, a total of 2 155 536te of maize output was recorded from an area of 1 875 297ha giving an average output per ha of 1.15te. This was an improvement from the 2015/16 average output of 0.44te/ha. According to the Zimbabwe Vulnerability Assessment Committee (ZimVac) report of 2018, total grain output was 1 998 041te against a requirement of 1 735 146te leaving a surplus of 101 000te.

Zimbabwe can store surplus grain, and the Strategic Grain Reserve management responsibility rests with the Grain Marketing Board, a government parastatal established to manage the strategic grain reserves (SGR). The SGR is should have a minimum of 500 000te each year, however, there have been challenges in meeting this requirement in the last decade.

Table 5.1 below gives the maize production statistics for Zimbabwe from 1986 to the 2017. What is apparent from this table is the decrease in yields per hectare that came after the Land reform program in the year 2000. More work is needed in growing the farmers on two fronts, technical production knowhow and resources so that the output per hectare can go up significantly.

Table 5. 1 Maize production (ha) and yields (Kg/ha); by farm type form 1986-2017

Growing	Harvest	COMMUNAL			LARGE SCALE COMMERCIAL/*A2			NATIONAL		
		Production (mt)	Area (ha)	Yield (kg/ha)	Production (mt)	Area (ha)	Yield (kg/ha)	Production (mt)	Area (Ha)	Yield (t/ha)
1986/87	1987	1,064,000	627,700	1,695	466,000	147,100	3,168	1,530,000	774,800	1.975
1987/88	1988	1,609,300	1,149,500	1,400	643,800	150,000	4,292	2,253,100	1,299,500	1.734
1988/89	1989	1,188,200	1,030,000	1,154	743,000	168,300	4,415	1,931,200	1,198,300	1.612
1989/90	1990	1,262,300	971,000	1,300	731,500	178,800	4,091	1,993,800	1,149,800	1.734
1990/91	1991	1,019,300	926,200	1,101	566,500	175,000	3,237	1,585,800	1,101,200	1.440
1991/92	1992	115,200	728,000	158	245,800	153,000	1,607	361,000	881,000	0.410
1992/93	1993	1,133,600	1,040,000	1,090	878,250	198,000	4,436	2,011,850	1,238,000	1.625
1993/94	1994	1,313,600	1,169,200	1,124	1,012,400	232,000	4,364	2,326,000	1,401,200	1.660
1994/95	1995	399,400	1,209,200	330	440,200	188,700	2,333	839,600	1,397,900	0.601
1995/96	1996	1,687,000	1,330,000	1,268	922,000	205,000	4,498	2,609,000	1,535,000	1.700
1996/97	1997	1,453,000	1,483,000	980	738,370	157,100	4,700	2,191,370	1,640,100	1.336
1997/98	1998	727,550	1,057,000	688	690,480	166,800	4,140	1,418,030	1,223,800	1.159
1998/99	1999	845,300	1,262,000	670	674,260	184,400	3,657	1,519,560	1,446,400	1.051
1999/00	2000	938,709	1,212,540	774	680,942	160,577	4,241	1,619,651	1,373,117	1.180
2000/01	2001	993,940	1,084,100	917	532,388	155,888	3,415	1,526,328	1,239,988	1.231
2001/02	2002	310638	1,199,021	259	294,120	128,833	2,283	604,758	1,327,854	0.455
2002/03	2003	817,446	1,225,791	667	241,340	126,577	1,907	1,058,786	1,352,368	0.783
2003/04	2004	1,505,970	1,400,800	1,075	180,181	93,010	1,937	1,686,151	1,493,810	1.129
2004/05	2005	837,304	1,659,424	505	78,062	70,443	1,108	915,366	1,729,867	0.529
2005/06	2006	1,385,957	1,650,158	840	98,882	62,841	1,574	1,484,839	1,712,999	0.867
2006/07	2007	1,080,624	1,390,132	777	80,986	55,683	1,454	952,600	1,445,800	0.659
2007/08	2008	134,532.6	1,023,562	130	92,279.48	139,029	660	470,700	1,722,322	0.270
2008/09	2009	62,511	121,452	4.35	231,604.4	88,808	12.78	1,242,566	1,521,780	0.810
2009/10	2010	536,051	167,658	460	259,668	112,324	2,140	1,327,572	1,803,542	0.700
2010/11	2011	614,507	133,120	460	354,000	147,537	1,890	1,451,629	2,096,034	0.693
2011/12	2012	390,325	1,040,297	380	154,300	100,765	1,690	968,041	1,689,786	1.000
2012/13	2013	770,025	1,237,731	622	28,571	90,633	315	798,596	1,265,236	0.630
2013/14	2014	1,409,050	1,550,170	909	47,103	105,196	448	1,456,153	1,655,366	0.880
2014/15	2015	279,300	934,789	300	222,255	106,936	2,060	742,215	1,531,663	0.480
2015/16	2016							511,816	1,161,997	0.440
2016/17	2017							2,155,526	1,875,297	1.150
2017/18	2018							1,700,702	1,722,718	0.990

Source: MLAWCRR Agricultural Statistical Bulletin 2017

Note 1: Resettlement Areas included in Communal Area Totals from 1980/81 onwards, Small Scale A2 Totals in A2 Area Totals from 1985/2013

5.2 Tobacco

This is the second most important crop in the country. It is grown mainly for forex generation with 98% of the crop being exported. The crop offers lucrative returns to farmers. Traditionally it was grown by commercial farmers, however, with the land reform program, a lot of small-scale growers have joined the production of the crop and now account for over 80% of the registered growers. Zimbabwe's tobacco output suffered greatly after the land reform program recording the lowest output of 48million kg in the year 2008. Production has however rebounded with volumes of 252 million kgs having been recorded in the 2017/2018 season. A lot of contract growing schemes have come up to cover the financing gap and skills knowhow that had been lost with the changes in land ownership after 2000 and hence the quick recovery in both output and yields when compared to other crops. Statistics from the tobacco industry marketing board (TIMB), a government parastatal established to oversee the marketing of Zimbabwe's tobacco, indicated that 110 216ha of tobacco

was grown in the year 2017. The hectarage grown has hovered between 70 000ha to just above 130 000ha in the last few years. The crop is mainly produced in the high and medium veld areas of the country with the bulk of growers concentrated in Mashonaland West, Mashonaland Central, Mashonaland East and to some extend in Manicaland. Zimbabwe grows mainly the flue-cured Virginia tobacco types. Production of Burley and Oriental tobacco has been on the decline and now contributes less than 1% of the tobacco output. In the commercial farming areas, tobacco is grown as both a dryland and an irrigated crop. The smallholder farmers grow the dryland crop.

Table 5.2 below shows tobacco growing statistics from 1996 to 2018. It shows the number of registered growers, the production output in kilograms, the hectares grown, average yield per hectare and the average prices fetched by the tobacco. Table 5.3 shows the tobacco growing statistics by farm category/type.

Table 5. 2 Tobacco Production data from 1996-2018

Year	No. Growers	Area (ha)	Mass sold (kg)	Average Price		Average yield (kg/ha)	Gross value	
				ZW$/kg	US$/kg		US$	ZW$
2018	140,895	133,000	252,603,251		2.92	1,899	**737,431,247**	
2017	98,918	110,216	188,920,318		2.96	1,714	559,119,986	
2016	81 801	102,537	202,275,688		2.95	1,972	595,927,523	
2015	97 616	104,662	198,954,849		2.95	1,900	586,544,231	
2014	106 372	102,537	216,196,683		3.17	2,108	685,244,013	
2013	78 756	88 627	166,572,097		3.67	1,879	612,135,672	
2012	60 047	76 359	144 565 253		3.65	1 893	527 805 943	
2011	56,656	78 415	132,431,905		2.73	1 689	361,448,679	
2010	51 685	67 054	123 503 681		2.88	1 842	355 572 326	
2009	29 018	62 737	58 570 652		2.98	934	174 457 761	
2008	35 094	61 622	48 775 178		3.21	792	156 663 816	
2007	26 412	54 551	73 039 015		2.32	1 339	169 159 675	19 527108 198
2006	20 565	58 808	55 466 689	0.35	2.00	943		1 666 410 523
2005	31 761	57 511	73 376 990	22.71	1.61	1 300		593 537 303
2004	21 882	44 025	68 901 129	861.43	2.00	1 565		147 508 194
2003	20 513	49 571	81 806 414	180.31	2.25	1 673		59 576 224
2002	14 353	74 295	165 835 001	35.93	2.27	2 213		35 371 686
2001	7 937	76 017	202 535 209	17.46	1.75	2 664		19 266 709
2000	8 537	84 857	236 946 295	8.13	1.69	2 792		12 726 314
1999	7 194	84 762	192 145 383	6.62	1.74	2 267		75 501 393
1998	8 334	91 905	215 913 864	3.47	1.72	2 349		4 976 043
1997	5 101	90 630	171 542 696	2.90	2.33	1 893		5 848 818
1996	2 921	81 231	201 550 527	2.90	2.94	2 481		3 584 710

Source: Tobacco Industry marketing Board (TIMB), 2019

Table 5. 3 Tobacco Output by Farm type from 2014-2018

YEAR	Farm Type	No of Growers	MASS_SOLD	USD VALUE	USD/KG	YIELD	HECTARES
	A1	52,918	71,251,736	195,774,274	2.75	1,551	45,934
	A2	9,190	73,795,590	238,784,584	3.24	2,676	27,576
	COMMUNAL	70,551	86,827,243	240,409,778	2.77	1,796	48,356
	SMALL SCALE COMMERCIAL	8,236	20,728,683	62,462,611	3.01	1,862	11,134
	GRAND TOTAL	**140,895**	**252,603,251**	**737,431,247**	**2.92**	**1,899**	**133,000**
2017	A1	27,341	51,283,419	135,149,635	2.24	40,072	1,280
	A2	7,014	70,892,762	237,697,628	2.28	27,662	2,561
	COMMUNAL	35,289	57,290,484	150,493,984	2.30	50,367	1,137
	SMALL SCALE COMMERCIAL	5,894	19,867,426	62,756,241	2.33	10,352	1,919
	GRAND TOTAL	**75,392**	**198,954,849**	**586,444,231**	**2.95**	**128,454**	**1,551**
2016	A1	27,134	50,877,853	134,483,970	2.64	36,445	1,396
	A2	6,564	79,274,099	262,122,732	3.31	40,674	1,949
	COMMUNAL	34,265	52,559,259	139,755,133	2.66	42,318	1,242
	SMALL SCALE COMMERCIAL	5,474	19,573,383	59,568,247	3.04	10,880	1,799
	GRAND TOTAL	**73,437**	**202,284,594**	**595,930,082**	**2.95**	**130,318**	**1,552**
2015	A1	27,282	51,283,419	135,149,635	2.64	1,280	40,072
	A2	6,982	70,892,762	237,697,628	3.35	2,561	27,662
	COMMUNAL	35,253	57,290,484	150,493,984	2.63	1,137	50,367
	SMALL SCALE COMMERCIAL	5,875	19,867,426	62,756,241	3.16	1,919	10,352
	GRAND TOTAL	**75,392**	**199,334,091**	**586,097,488**	**2.94**	**1,551**	**128,453**
2014	A1	38,710	60,052,611	176,714,208	2.94	1,852	32,433
	A2	11,697	75,258,928	266,773,413	3.54	3,435	21,907
	COMMUNAL	47,236	58,985,756	171,257,700	2.90	1,519	38,838
	SMALL SCALE COMMERCIAL	8,729	21,899,388	70,498,692	3.22	2,340	9,359
	GRAND TOTAL	**106,372**	**216,196,683**	**685,244,013**	**3.17**	**2,108**	**102,537**

Source: Tobacco Industry Marketing Board, 2019

5.3 Cotton

Cotton Production has declined significantly in Zimbabwe in the last few years mainly owing to the poor returns from the crop. The crop is produced mainly by small scale growers most of them in communal areas. Statistics show that close to 1 million people rely on the crop for their cash requirements. The crop is grown extensively throughout the country. Peak production of 352 000te of the crop was recorded in the country in 2013 before it fell to just 28 000te in 2015 due to a combination of lack of funding and the poor global prices for cotton lint. The Presidential Free Input Scheme was launched in 2016 in response to the low levels of production and near collapse of cotton production in Zimbabwe. In the first year of inception USD42million dollars was injected into the sector through the Cotton Company of Zimbabwe, an additional USD60 million was also injected in the second year. In 2017 and 2018 cotton was put under the government input programme and fertilizer was given to farmers in the major cotton growing areas under what was termed the presidential input scheme. The increase in output as a response is noted in 2017 were output jumped from an all time low of 33 thousand metric tonnes in 2016 to 126 995metric tonnes in 2017. The slump in production from 2015 was mainly a result of the fall in cotton lint prices on the world market which in turn saw farmers getting very little return for their effort. Table 5.4 below gives the production

statistics for cotton from 1986 to 2017. Another apparent trend from the yields has been the general decline from the year 2000 because of the disturbances in extension services and financing structures after the land reform program. Frequent droughts that have been experienced have also resulted in a decrease in yields as almost all the cotton grown is rainfed.

Table 5. 4 Seed Cotton Production data from 1986-2017

Season	COMMUNAL			A2			NATIONAL		
	Area (Ha)	Production (mt)	Yield (kg/Ha)	Area (Ha)	Production (mt)	Yield (kg/Ha)	Area (Ha)	Production (mt)	Yield (t/Ha)
1986/87	138,000	82,800	0.600	102,086	197,216	1,932	240,086	280,016	1.166
1987/88	161,000	136,850	0.850	110,787	202,103	1,824	271,787	338,953	1.247
1988/89	153,000	122,801	0.803	87,571	147,424	1,683	240,571	270,225	1.123
1989/90	153,000	102,960	0.673	64,486	102,281	1,586	217,486	205,241	0.944
1990/91	197,000	137,900	0.700	77,222	123,151	1,595	274,222	261,051	0.952
1991/92	183,000	35,700	0.195	52,777	40,532	768	235,777	76,232	0.323
1992/93	199,000	134,500	0.676	47,300	79,800	1,687	246,300	214,300	0.870
1993/94	181,150	110,805	0.612	40,150	70,675	1,760	221,300	181,480	0.820
1994/95	179,760	56,100	0.312	33,800	36,440	1,078	213,560	92,540	0.433
1995/96	217,620	157,584	0.724	40,000	73,070	1,827	257,620	230,654	0.895
1996/97	267,500	197,825	0.740	45,755	80,359	1,756	313,255	278,184	0.888
1997/98	239,000	182,550	0.764	47,000	90,300	1,921	286,000	272,850	0.954
1998/99	274,500	188,350	0.686	188,350	76,630	407	462,850	264,980	0.572
1999/00	326,000	263,400	0.808	31,031	47,111	1,518	357,031	310,511	0.870
2000/01	320,000	208,000	0.650	31,574	45,854	1,452	351,574	253,854	0.722
2001/02	316,500	127,350	0.402	32,397	35,039	1,082	348,897	162,389	0.465
2002/03	138,184	128,140	0.927	3,620	4,356	1,203	141,804	132,496	0.934
2003/04	234,784	244,810	1,043	11,256	7,801	693	246,040	252,611	1.027
2004/05	239,864	154,411	0.644	6,183	3,426	554	246,047	157,837	0.641
2005/06	200,209	149,458	0.747	5,953	4,150	697	206,162	153,608	0.745
2006/07	340,235	218,708	0.643	8,461	5,288	625	348,696	223,996	0.642
2007/08	431,131	226,435	0.400				431,131	226,435	0.400
2008/09	337,671	246,757	0.730				337,671	246,757	0.730
2009/10	338,270	260,000	0.770				338,270	260,000	0.770
2010/11	379,689	220,219	0.580				379,689	220,219	0.580
2011/12	432,901	254,888	0.590				432,901	254,888	0.590
2012/13	241,849	133,017	0.550				241,849	133,017	0.550
2013/14	201678	147 360	0.731				201 678	147 360	0.731
2014/15							146,527	52,623	0.360
2015/16							101,660	32,885	0.320
2016/17							207,786	126,995	0.600
2017/2018							200,591	130,342	0.650

Source: MLAWCRR Agricultural Statistical Bulletin 2017

5.4 Soyabean

Worldwide soyabean is fast becoming the world's largest source of animal and human protein. Production has grown 4 times in the last 20 years at an average annual growth rate of 8%. The global output tonnage has grown from 50m tonnes to 250m tonnes in just 20 years. In Southern Africa, Zimbabwe is one of four countries that grow soyabean on a commercial scale, the other countries include Malawi, South Africa and Zambia. Zimbabwe's annual output has however failed to grow, with only 55 000te having been produced in the 2017/18 season. The country has capacity to produce more, given that the climatic conditions are favourable. There are local soya bean breeding programs producing the most suitable varieties for Zimbabwe and the soils are generally favourable. However, most of the soya consumed in the country is imported owing to economies of scale that favour big volume producing countries such as the United States of America, Brazil and others. Soyabean in

Zimbabwe is primarily used to produce cooking oil and livestock feeds. The country has crushing capacity with 3 companies owning plants with large-scale solvent extraction capacity. There are several other smaller, farmer run mechanical extraction and full fat plants. Soyabean production in Zimbabwe has mainly been confined to commercial farming and consequently production is concentrated in the commercial farming sectors with very little crop grown outside commercial farms.

Table 5. 5 Soyabean Production

Growing	Harvest	COMMUNAL			A2			NATIONAL		
Season	Year	Production	Area	Yield	Production	Area	Yield	Production	Area	Yield
		(mt)	(ha)	(kg/ha)	(mt)	(ha)	(kg/ha)	(mt)	(ha)	(kg/ha)
1985/86	1986	960	1,600	600	72,600	40,600	1,788	73,560	42,200	1,743
1986/87	1987	871	2,488	350	93,924	56,264	1,669	94,795	58,752	1,613
1987/88	1988	2,264	2,830	800	118,146	61,640	1,917	120,410	64,470	1,868
1988/89	1989	4,500	5,000	900	121,615	65,780	1,849	126,115	70,780	1,782
1989/90	1990	1,800	1,800	1,000	108,513	60,620	1,790	110,313	62,420	1,767
1990/91	1991	2,040	2,550	800	95,255	55,320	1,722	97,295	57,870	1,681
1991/92	1992	650	2,800	232	50,475	42,300	1,193	51,125	45,100	1,134
1992/93	1993	1,445	2,375	608	69,075	30,100	2,295	70,520	32,475	2,172
1993/94	1994	1,215	2,050	593	100,090	50,110	1,997	101,305	52,160	1,942
1994/95	1995	220	1,240	177	77,050	70,140	1,099	77,270	71,380	1,083
1995/96	1996	415	1,050	395	109,895	57,670	1,906	110,310	58,720	1,879
1996/97	1997	2,565	4,040	635	89,600	56,000	1,600	92,165	60,040	1,535
1997/98	1998	2,436	4,060	600	108,070	60,100	1,798	110,506	64,160	1,722
1998/99	1999	3,724	4,360	854	103,454	47,090	2,197	107,178	51,450	2,083
1999/00	2000	2,923	5,448	537	132,494	55,202	2,400	135,417	60,650	2,233
2000/01	2001	10,900	10,750	1,014	129,893	53,259	2,439	140,793	64,009	2,200
2001/02	2002	7,260	16,500	440	77,181	34,782	2,219	84,441	51,282	1,647
2002/03	2003	4,437	4,440	999	36,760	20,950	1,755	41,197	25,390	1,623
2003/04	2004	39,176	24,206	1,618	46,651	25,366	1,839	85,827	49,572	1,731
2004/05	2005	34,974	30,652	1,141	21,756	11,219	1,939	56,730	41,871	1,355
2005/06	2006	47,213	37,489	1,259	23,060	9,648	2,390	70,273	47,137	1.491
2006/07	2007	92,252	59,072	1,562	20,074	10,815	1,856	112,326	69,887	1.607
2007/08	2008*							72,311	48,320	1.5
2008/09	2009							85,227	115,817	1.35
2009/10	2010							48,010	70,256	1.46
2010/11	2011							60,124	84,173	1.4
2011/12	2012							51,869	70,542	1.36
2012/13	2013							76,933	59,179	1.3
2013/14	2014							84,661	67,507	1.254
2015/16	2016							47,832	39,935	1,200
2016/17	2017							35,744	21,561	1,660
2017/18	2018							59,772	40,479	1,480

5.5 Sugarcane

In Zimbabwe sugarcane is grown in the South East lowveld. Sugarcane is produced by large scale corporates namely Tongaat Hulett, Green Fuels, Hippo Valley and some small-scale commercial farmers that give feedstock to Triangle. Tongaat Hulett owns 100% of the Triangle Estate and has 50.3% shareholding in Hippo valley which is listed on the Zimbabwe stock exchange. Triangle Estate is the bigger of the two with sugarcane established on 16 000ha with the 2000ha produced at Mwenazana estates. Hippo valley grows sugarcane on 12 500ha. Mkwasine produces sugarcane under an out-grower model with small-scale commercial farmers. 8 200ha of sugar cane is grown under this model. Both Triangle and Hippo valley have sugarcane crushing capacity. The sugar cane mill at Triangle has capacity to crush close to 3million tonnes of sugarcane producing over 300 000 tonnes of raw sugar annually. The triangle plant also produces 25million litres of industrial grade rectified spirits from molasses annually for sale onto the regional market. The combined capacity of both the Triangle and Hippo valley mills is close to 4,8 million tonnes of cane crushing capacity which can produce 640 000 tonnes of sugar annually. Refining capacity is 140 000te annually.

Sugar cane is also produced in Chisumbanje and Middle Sabi. These operations are a joint venture between the government owned Agricultural and Rural Development Authority (ARDA) and Macdom and Ratings (a private entity) under the Green fuel project. The Chisumbanje and Middle Sabi operations are focused on production of ethanol, with the plant located at the Chisumbanje Estate. The ethanol plant is one of the largest ethanol producing plants in Africa. The project was given national project status resulting in government coming up with a mandatory petrol blending statute to enable greater sustainability of the operations while reducing government expenditure on fuel. The joint venture arrangement is based on Built Operate and Transfer (BOT) of 20 years.

Sugarcane for cane consumption is also grown in Manicaland. On average of between 7000 ha of the crop is grown in Manicaland for this purpose. Table 5.6 below gives the production statistics for sugarcane grown based on the crop assessments reports. However, on analysis of sugarcane grown by crop, only the statistics for sugar cane grown in the Lowveld for sugar production will be used as there are serious gaps on consumption data from the other sources. When you look at the figures from the annual crop assessments reports from the MLAWCRR, they seem to have been a bit inflated because Triangle and Hippo Valley should be producing the bulk of the sugar cane in the country.

Table 5. 6 Sugarcane Production data from 2014-2018

Growing Season	National			Triangle			Hippo valley			Total Hippo Valley and Triangle		
	Production (mt)	Area (ha)	Yield (kg/ha)	Production (mt)	Area (ha)	Yield (kg/ha)	Production (mt)	Area (ha)	Yield (kg/ha)	Production (mt)	Area (ha)	Yield (kg/ha)
2014	5,333,360	66,667	80,000	1,187,500	12,500	95,000	1,092,434	12,777	85,500	2,279,934	25,277	90,198
2015	5,386,693	67,334	80,000	1,125,000	12,500	90,000	1,119,265	12,777	87,600	2,244,265	25,277	88,787
2016	5,440,560	68,680	79,000	1,150,000	12,500	92,000	1,083,490	12,777	84,800	2,233,490	25,277	88,361
2017	5,562,674	70,422	79,200	1,000,000	12,500	80,000	992,773	12,777	77,700	1,992,773	25,277	78,837
2018				1,187,500	12,500	95,000	1,391,415	12,777	108,900	2,578,915	25,277	102,026

Source: The national figures were extracted from the annual crop assessment reports from the MLAWCRR while the Hippo Valley and Triangle figures were obtained from the Estates.

5.6 Tea and Coffee

Tea and coffee are significant crops produced mainly in Manicaland. Most operations are run by large corporates due to the capital-intensive nature of crops. Tea is mostly produced in estates that are concentrated in Chipinge district. The Tanganda Tea Company limited, a subsidiary of the Meikles group and Ariston Holdings own the tea estates in Chipinge. Both companies are listed on the Zimbabwe Stock Exchange. The operation in Honde Valley, the Eastern Highlands Plantations Limited, is owned by the PGI group based in the UK. While significant volumes from all these operations are absorbed on the domestic market, a greater part of tea produced is meant for the export market.

Table 5. 7 Tea Production data from 2014-2017

Growing Season	National			
	Production (mt)	Area (ha)	Yield (kg/ha)	Yield /kg From Tea Estates statistics
2014	24,486	8,162	3,000	1,300
2015	10,016	6,260	1,600	1,200
2016	10,166	6,322	1,610	1,250
2017	7,830	6,572	1,200	1,400
2018	9,750	6,500	1,500	1,525

Source: Annual Crop assessment reports, MLAWCRR, 2014 to 2017

Table 5. 8 Coffee Production data from 2014-2017

Growing Season	National		
	Production (mt)	Area (ha)	Yield (kg/ha)
2014	1,961	654	2,998
2015	450	750	600
2016	455	825	552
2017	500	600	830
2018	320	400	790

Source: Annual Crop assessment reports, MLAWCRR, 2014 to 2017

6.0 Consolidated fertilizer data

Table 6. 1 Fertilizer recommended rates

Crops	Agro ecological zone	Administrative zone	Expected yield	Time of application	Fertilizer product	RAR per product (kg/ha)
Maize	Countrywide		5te av	At planting	NPK 7:14:7+8S	300
Maize	Countrywide		5te av	At planting	NPK 14:28:14+6S	200
Maize	Regions (3, 4 and 5)		3te	At planting	NPK 7:14:7+7.5S+1ZN	250
Maize	Countrywide		5te av	21 days after planting	AN (34.5%N)	250
				42 days after planting	AN (34.5%N)	250
Tobacco	Regions (2 and 3)		2.5te	At planting	NPK 5:15:12+7.5S+0.1B	700
Tobacco	Regions (2 and 3)		2.5te	At planting	NPK 6:28:23+8S+0.18B	450
Tobacco	Regions (2 and 3)		2.5te	At planting	NPK 10:24:20+8S+0.18B	500
Tobacco	Regions (2 and 3)		2.5te	35 days after planting	AN (34.5%N)	150
Soyabean	Regions (2, 3,4 and5)		2te	At planting	NPK 5:18:10+8S+0.25B	300
Soyabean	Regions (2, 3,4 and5)		2te	At planting	NPK 6:27:20+7.5S+0.4B	200
Cotton	Regions (2, 3,4 and5)		1.5te	At planting	NPK 5:18:10	200
Cotton	Regions (2, 3,4 and5)		1.5te	42 days after planting	AN (34.5%N)	100
Sugarcane	Region (4 and5)		90te	7 days after harvesting	SSP (19% P205;8%S)	400
Sugarcane	Region (4 and 5)		90te	7 days after harvesting	MAP (42%P205;12%N;6%S)	176
Sugarcane				7 days after harvesting	MOP (60%K20)	200
Sugarcane	Region (4 and 5)		90te	35 days after harvesting	Urea (46%N)	400
Sugarcane	Region (4 and 5)		90te	35days after harvesting	AN (34.5%N)	540

Source: ZFC Limited crop recommendations

Notes to the table:

1. The AN application for maize is split into two by 250kg/ha applications at 3 weeks after emergence (wae) and at 6 wae.
2. For sugarcane the source of phosphate, which is applied at the same time with MOP, 1 week after harvesting, can either be SSP or MAP depending on cost effectiveness and availability.
3. Top dressing for sugarcane, again depending on cost effectiveness and availability can either be Urea or AN and this can be applied at 5 weeks after harvest or in three split applications at 2, 6 and 12 weeks after harvesting.

Table 6. 2 Fertilizer consumption (Mt) in Sugarcane from 2014-2018

Fertilizer type		**2014**			**2015**			**2016**			**2017**			**2018**		
		Triangle	Hippo	**Total**	Triangle	Hippo	**Total**	Triangle	Hippo	**Total**	Triangle	Hippo	**Total**	Triangle	Hippo	**Total**
MAP(42%P205;12%N;6%S)		0	0	**0**	539.4	599.4	**1,138.8**	415.08	461.2	**876.28**	953.8	1,059.8	**2,013.6**	867.5	963.9	**1,831.4**
MOP (60%K20)		1,020.9	1,134.3	**2,155.2**	1,305.7	1,450.7	**2,756.4**	812.4	902.7	**1,715.1**	1,297.8	1,442.0	**2,739.8**	2,169.9	2,411.1	**4,581.0**
AN (34.5%N)		1,081.1	1,201.3	**2,282.4**	534.9	594.3	**1,129.2**	650.1	722.4	**1,372.5**	256.9	285.4	**542.3**	708	786.7	**1,494.7**
Urea(46%N)		2,416.6	2,685.1	**5,101.7**	2,753,1	3,059.2	**5,812.3**	2,756.7	3,063.0	**5,819.7**	2,920	3,245.5	**6,165.5**	3,142.7	3,491.9	**9,777.4**
SSP		1,230.9	1,367.7	**2,598.6**	555.3	67.7	**623**	0	0	**0**	0	0	**0**	529.2	588.6	**1,117.8**

Source: Estates Consumption statistics

Table 6. 3 Fertilizer Consumption (Mt) in Cotton from 2014 to 2018

Product	**2014**	**2015**	**2016**	**2017**	**2018**
5:18:10	2,500	2,500	22,885	30,059	19,041
CAN					135
Ammonium Nitrate	3,000	3,400	6,928	20,621	6,875

Source: Agricultural marketing Authority (AMA) Cotton input support schemes from 2014-2018

Table 6. 4 Fertilizer Consumption (Mt) in Soybean from 2014 to 2018

Product	**2014**	**2015**	**2016**	**2017**	**2018**
5:18:10	2,000	2,500	5,500	24,941	28,959

Source: Derived from the Agricultural trade data and the cotton input data from AM

Table 6. 5 Fertilizer Consumption (Mt) in Tobacco from 2014 -2018

Product	2014	2015	2016	2017	2018
6:28:23				10,000	14,750
10:24:20			10,000	3,800	7,107
5:15:12	29,650	35,000		57,000	40,000
6:15:12			30,000		
AN	7,000	7,500	7,000	16,700	15,600

Source: Agricultural trade data from 2014-2018

Table 6. 6 Fertilizer Consumption (Mt) in Tea from 2014 - 2018

Product	2014	2015	2016	2017	2018
22:22.05:0	3,960	3,800	3,950	3,760	4,000
22:6:10 +6%S	555	540	560	555	550
Urea	2,579	2,500	2,300	2,450	2,500

Source: Tea Estates consumption statistics from 2014-2018

Table 6. 7 Fertilizer Consumption (MT) in coffee from 2014 - 2018

Product	2014	2015	2016	2017	2018
14:5:20 + 0.05B	930	950	890	945	960

Source: Tea Estates Consumption statistics from 2014-2018

Table 6. 8 Fertilizer Consumption (MT) in Maize from 2014 - 2018

Product	2014	2015	2016	2017	2018
7:14:7	84,500	99,000	110,000	213,400	150,000
6:23:23			20,000	1,000	1,000
14:28:14			30,000	1,500	2,600
AN	68,800	118,500	154,600	128,179	95,900
Urea			11,500	56,500	54,000

7.0 Assumptions made in the Compilation of FUBC

The fertilizer usage and hectarages for cotton, tea, coffee and sugarcane given from the Estates from AMA for cotton were taken and used as the most representative of fertilizer consumption in these crops. Although there are out-grower farmers for sugarcane, tea and coffee who probably apply less fertilizer per hectarage, the consumption from these was disregarded because of lack of data records for their fertilizer use.

On splitting the Nitrogen use across maize and tobacco, from the trade data, it was assumed that application rates for the support of all tobacco supported by the basal fertilizer used per year was applied as per the recommendation as it was only 150kg of fertilizer applied per hectare. The assumption was that top dressing for tobacco would be applied as per recommendation. The balance of the Urea and Ammonium Nitrate left after all the other crop requirements were met as per the computations above, was then taken to be the top dressing used in Maize. The assumption was that any other top dressing used for other crops would be insignificant.

It was not possible to separate the consumption from wheat and maize and since the wheat figures were not that high all consumption was taken as for maize only.

8.0 Appendices

Table 8. 1 Actual Fertilizer Applied in nutrient metric tonnes by crop from 2014-2018

Crops / groups of crops	Planted Area (000 ha)	Average Yield (kg/ha)	Total Fertilizer Consumption (metric tonnes nutrients)		
			N	P_2O_5	K_2O
Maize					
2014 + 2014/15	1,655	880	29651	11830	5915
2015 + 2015/16	1,532	480	47813	13860	6930
2016 + 2016/17	1,162	440	71727	28400	16500
2017 + 2017/18	1,875	1,150	73835	30526	15378
2018 + 2018/19	1,733	990	68850	21958	11094
Tobacco					
2014 + 2014/15	133	1,899	3898	4448	3558
2015 + 2015/16	110	1,714	4338	5250	4200
2016 + 2016/17	103	1,972	5215	6900	4200
2017 + 2017/18	105	1,900	9592	12262	9520
2018 + 2018/19	103	2,108	8978	11836	8903
Soyabean					
2014 + 2014/15	59	1,300	100	450	550
2015 + 2015/16	68	1,254	125	450	250
2016 + 2016/17	40	1,200	275	990	550
2017 + 2017/18	22	1,660	1247	4489	2494
2018 + 2018/19	40	1,480	1448	5213	2896
Cotton					
2014 + 2014/15	203	731	1160	450	250
2015 + 2015/16	147	360	1298	450	250
2016 + 2016/17	102	320	3534	4119	2289
2017 + 2017/18	208	600	8617	5411	3006
2018 + 2018/19	201	650	3360	3427	1904
Sugarcane					
2014 + 2014/15	25	90	3134	494	1293
2015 + 2015/16	25	89	3200	597	1654
2016 + 2016/17	25	88	3256	368	1029
2017 + 2017/18	25	79	3265	846	1644
2018 + 2018/19	25	102	5233	982	2749
Tea					
2014 + 2014/15	8	1,300	2180	905	254
2015 + 2015/16	6	1,200	2105	868	244
2016 + 2016/17	6	1,250	2050	903	254
2017 + 2017/18	7	1,400	2076	861	244
2018 + 2018/19	7	1,525	2151	913	255
Coffee					
2014 + 2014/15	0.654	2,998	130	47	186
2015 + 2015/16	0.750	600	133	48	190
2016 + 2016/17	0.450	552	125	45	178
2017 + 2017/18	0.500	830	132	47	189
2018 + 2018/19	0.320	790	134	48	192

Table 8.1 above shows the fertilizer application trends by crop from 2014 to 2018 in nutrient metric tonnes against the hectarages grown per crop. Application rates are generally high for cash crops that are grown by estates/corporates and for well financed crops like tobacco which have very well organized contract schemes that are financed by the buyers of the crop. Fertilizer application in Cotton only started going up in 2017 after the intervention of government who are now subsidizing fertilizer to the communal farmers that grow this crop.

Table 8. 2 Actual Fertilizer Applied in nutrient kg per ha by crop against recommended application rates

Crops / groups of crops	Planted Area (000 ha)	Average Yield (kg/ha)	Percent of the Planted Area that is Fertilized (%)			Recommended Application Rate (kg nutrient/ha)			Actual Application Rate (kg nutrient/ha)		
			N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Maize											
2014 + 2014/15	1,655	880	100 %	100 %	100 %	194	42	21	17.92	7.15	3.57
2015 + 2015/16	1,532	480	100 %	100 %	100 %	194	42	21	31.21	9.05	4.52
2016 + 2016/17	1,162	440	100 %	100 %	100 %	194	42	21	61.73	24.44	14.20
2017 + 2017/18	1,875	1,150	100 %	100 %	100 %	194	42	21	39.38	16.28	8.20
2018 + 2018/19	1,733	990	100 %	100 %	100 %	194	42	21	39.73	12.67	6.40
Tobacco											
2014 + 2014/15	133	1,899	100 %	100 %	100 %	86	105	84	29.30	33.44	26.75
2015 + 2015/16	110	1,714	100 %	100 %	100 %	86	105	84	39.43	47.73	38.18
2016 + 2016/17	103	1,972	100 %	100 %	100 %	86	105	84	50.63	66.99	40.78
2017 + 2017/18	105	1,900	100 %	100 %	100 %	86	105	84	91.35	116.78	90.67
2018 + 2018/19	103	2,108	100 %	100 %	100 %	86	105	84	87.16	114.91	86.44
Soyabean											
2014 + 2014/15	59	1,300	100 %	100 %	100 %	12	54	30	1.69	7.63	9.32
2015 + 2015/16	68	1,254	100 %	100 %	100 %	12	54	30	1.84	1.84	3.68
2016 + 2016/17	40	1,200	100 %	100 %	100 %	12	54	30	6.88	24.75	13.75
2017 + 2017/18	22	1,660	100 %	100 %	100 %	12	54	30	56.68	204.06	113.37
2018 + 2018/19	40	1,480	100 %	100 %	100 %	12	54	30	36.20	130.32	72.40
Cotton											
2014 + 2014/15	203	731	100 %	100 %	100 %	45	36	20	5.71	2.22	1.23
2015 + 2015/16	147	360	100 %	100 %	100 %	45	36	20	8.83	3.06	1.70
2016 + 2016/17	102	320	100 %	100 %	100 %	45	36	20	34.65	40.39	22.44
2017 + 2017/18	208	600	100 %	100 %	100 %	45	36	20	41.43	26.01	14.45

2018 + 2018/19	201		650		100 %	100 %	100 %		45	36	20		16.72	17.05	9.47
Sugarcane															
2014 + 2014/15	25		90		100 %	100 %	100 %		205	74	120		124.37	19.59	51.31
2015 + 2015/16	25		89		100 %	100 %	100 %		205	74	120		128.00	23.87	66.15
2016 + 2016/17	25		88		100 %	100 %	100 %		205	74	120		130.23	14.72	41.16
2017 + 2017/18	25		79		100 %	100 %	100 %		205	74	120		130.59	33.83	65.76
2018 + 2018/19	25		102		100 %	100 %	100 %		205	74	120		209.32	39.26	109.94
Tea															
2014 + 2014/15	8		1,300		100 %	100 %	100 %		46	13	21		272.46	113.06	31.69
2015 + 2015/16	6		1,200		100 %	100 %	100 %		46	13	21		350.80	144.73	40.67
2016 + 2016/17	6		1,250		100 %	100 %	100 %		46	13	21		341.70	150.43	42.25
2017 + 2017/18	7		1,400		100 %	100 %	100 %		46	13	21		296.61	122.93	34.79
2018 + 2018/19	7		1,525		100 %	100 %	100 %		46	13	21		307.29	130.43	36.43
Coffee															
2014 + 2014/15	0.654		2,998		100 %	100 %	100 %		81	29	116		199.08	71.10	284.40
2015 + 2015/16	0.750		600		100 %	100 %	100 %		81	29	116		177.33	63.33	253.33
2016 + 2016/17	0.450		552		100 %	100 %	100 %		81	29	116		276.89	98.89	395.56
2017 + 2017/18	0.500		830		100 %	100 %	100 %		81	29	116		264.60	94.50	378.00
2018 + 2018/19	0.320		790		100 %	100 %	100 %		81	29	116		420.00	150.00	600.00

Table 8.2 above shows the recommended versus actual applied fertilizers by nutrient kilograms per hectare. The actual average fertilizer consumption per hectare was lower for maize than the recommended across all years. This is because maize is grown across the country even in the marginal areas that don't receive enough rainfall. A good percentage of the crop is grown by communal farmers with limited resources. The general practice among communal farmers is that they will apply fertilizer but not to the recommend levels because of resource constraints. They also supplement with cattle manure and compost from farm crop residues. Farmers also generally follow the recommended applications and scale down proportionately depending on the amount of fertilizer they would have managed to purchase. Government schemes sometimes complement their efforts. Currently there is a drive to encourage them to carry out soil tests so that application would be based on there particular soil needs but most have not yet embraced the practice. Soils are generally acidic because of continuous application of fertilizers without liming of the land.

The A2 farmers and other commercial farmers carry out soil tests and feed their crops as per the soil analysis results recommendation. Where they don't carry out soil analysis, they normally then follow the general crop recommendations and apply to the required levels. On the other hand, most communal farmers do not have enough resources to purchase fertilizer. They produce most of their crops for own consumption and only sell the surplus to provide an income for their other needs. They

therefore depend on government schemes where they do not normally get their full requirements. Application rates are therefore very low. As a result, because the commercial farmers are much less than the aggregate communal farmers, the net effect of averaging is to pull down the application rates to lower levels than the recommended. There is therefore scope to increase the fertilizer usage in Zimbabwe.

The application rate for tea, coffee and sugar cane are higher than recommended because the estates or corporate growers considered in the study normally apply fertilizers based on soil analysis results and they generally have more resources available to apply fertilizers correctly. However, the hectarages grown under out-growers and other communal farmers were not considered because it was difficult to collect these and get the fertilizers applied as well.

The application rates in Soya and Cotton generally went up after the introduction of the government subsidy programs in 2017 and 2018. Most of the cotton in Zimbabwe is grown by small holder farmers with limited resources. Even when they are given enough fertilizer for the cotton requirements, they take part of it to cover the other crops especially maize which is the staple food. Cotton production went down because of a fall in prices of lint on the world market.

Tobacco application rates are relatively high because farmers generally grow manageable hectarages because production is labour intensive. Growers are also generally well financed, monitored and given technical assistance by well-established contract schemes.

9.0 Gaps In data and Limitations of the Study

As a result of the lack of data on actual fertilizer application from the MLAWCRR, the main basis of fertilizer consumed was from trade data. Trade and or sales data, does not marry the fertilizer sold to the crops or hectarages grown. An assumption of which fertilizer went into what crops based on the product formulations and normal crops where the fertilizer is used are then used to marry these to hectarages grown. Zimbabwe seems to very strong in collecting and compiling the information on area planted, yields and production output but do not seem to systematically collect the fertilizer used in the production. There is therefore no proper check as to the accuracy of this data. This seems to be the major limitation to the study. The other major limitation or gap would be to know exactly how much of the traded fertilizer went into the crops planted and how much went into the next year, what was stored and spilled into the next year

One or two companies refused to share their trade data. This was key to verification of market intelligence information available but the margin of error from this was minimal as other verification methods were employed. This was easy especially for the past two to three years were most of this product was going through the Government schemes. This made it very easy to track and compute fairly accurate figures.