Proceedings of the Kenya Fertilizer Roundtable Conference

OCTOBER 16-17, 2018

KENYATTA INTERNATIONAL CONVENTION CENTRE (KICC), NAIROBI

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KCDMS Kenya Crops and Dairy Market Systems Activity

ONE ACRE FUND

AICL Specialty Fertilizers Where needs take us

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FOREWORD

Growth in the agriculture sector in Kenya is constrained by, among other factors, declining soil fertility and deteriorating soil health. The recent Fertilizer Roundtable Conference was an attempt to bring together key fertilizer stakeholders to discus and reach a consensus on policy interventions to address the declining soil fertility trend in our country, review fertilizer cost-reduction strategy, and provide advice on appropriate fertilizer recommendations and use of crop-specific fertilizers.

The theme of this year's conference was "*Increasing agricultural productivity through improved access and use of quality fertilizers*". The conference aimed at bringing together fertilizer stakeholders to start a dialogue and put in place mechanisms that will sustain such dialogue in the future. Furthermore, this conference was also expected to facilitate action on key fertilizer issues through multi-stakeholder dialogue and public-private task forces on an ongoing basis.

The fertilizer sector has a multiplicity of players, such as fertilizer and lime suppliers, policymakers, fertilizer regulatory bodies, laboratory services, transporters, research and extension services, agro-dealers and farmers. The conference provided a framework on ways to reach a consensus on the need to address the various challenges discussed through the formation of a multi-disciplinary Kenya Fertilizer Platform. A Fertilizer Platform is a public-private mechanism composed of key stakeholders involved in fertilizer access, quality and use, whose purpose is to resolve issues and facilitate dialogue and coordination and information exchange.

At the end of the conference, participants had exchanged ideas, information, knowledge and experiences in fertilizer access and usage among players in the sector, which hopefully will lead to increased farm productivity. The conference brought together 300 participants drawn from farmers/farmers' organizations, agro-dealers, researchers, policy institutions, universities, fertilizer and lime manufacturers, international fertilizer-related institutions, financial institutions and government ministries.

The keynote address was given by Dr. J. Scott Angle, then-President of the International Fertilizer Development Center (IFDC), while the official opening ceremony was presided over by the Cabinet Secretary Hon. Mwangi Kiunjuri EGH, MGH on 16 October 2018.

The conference was a product of year-long stakeholder consultation and resource mobilization. Various stakeholders, both individuals and institutions, participated in the conference preparation. Their efforts and contributions are appreciated and recognized.

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ACKNOWLEDGEMENTS

The successful hosting of the Seventh Fertilizer Roundtable Conference was a culmination of a long planning process which started in September 2017. It involved wide consultations between the Ministry, various institutions and individuals without whose commitment the conference would have been impossible to host. The State Department for Crops Development is particularly grateful to the Planning Committee composed of The Fertilizer Association of Kenya (FAK), International Fertilizer Development Center (IFDC), Africa Fertilizer and Agribusiness Partnership (AFAP), One Acre Fund, Tegemeo Institute, Kenya Agriculture and Livestock Research Organization (KALRO), Kenya Plant Health Inspectorate Service (KEPHIS), Kenya Institute for Public Policy Research and Analysis (KIPPRA), Joint Agriculture Secretariat (JAS) and Kenya Bureau of Standards (KEBS).

In addition, we appreciate the following distinguished sponsors whose generous contribution made the conference possible and successful. They are Diamond sponsor: Saudi Arabian Mining Company (Ma'aden); Platinum sponsor: Kenya Market Trust; Gold sponsor: IFDC; Silver sponsor: AGRA; and Bronze sponsor: Kenya Crops and Dairy Market Systems (USAID/KCDMS). The partnerships of One Acre Fund, Israel Chemical Limited (ICL) and Toyota Tsusho (Baraka fertilizers) are also highly appreciated. The twelve exhibitors who took part on the sidelines of the conference are also appreciated. The support and contribution of the Chair, Kenya Fertilizer Roundtable Conference, Ann A. Onyango, for facilitating successful stakeholder consultations and fundraising is highly appreciated. The tireless efforts and commitments demonstrated by the various presenters, session chairs, rapporteurs, the moderator Mr. Kinyua Mbijiwe, and the event manager also deserve special mention.

The leadership of the Principal Secretary, State Department for Agricultural Research and Principal Secretary for Crops Development, Prof. Hamadi Iddi Boga, was critical to the completion of the process, and his contribution is therefore highly appreciated.

Finally, Cabinet Secretary, Ministry of Agriculture, Livestock, Fisheries & Irrigation Hon Mwangi Kiunjuri EGH, MGH is appreciated for the exemplary leadership and for providing the right working environment and encouragement for hosting the Conference.

ACRONYMS

AAK	Agrochemical Association of Kenya
AATF	African Agricultural Technology Foundation
AFAP	African Fertilizer and Agribusiness Partnership
AGMARK	Agricultural Market Development Trust
AGRA	Alliance for a Green Revolution in Africa
AMOFERT	Mozambican Association for Fertilizers
ARM	Athi River Mining
ASDS	Agricultural Sector Development Strategy
CAN	Calcium Ammonium Nitrate
CEO	Chief Executive Officer
CIMMYT	International Maize and Wheat Improvement Center
COC	Certificate of Conformity
COMESA	Common Market for Eastern and Southern Africa
DAP	Diammonium Phosphate
EGS	Early Generation Seed
ERC	Energy Regulatory Commission
FAK	Fertilizer Association of Kenya
FAO	Food and Agriculture Organization of the United Nations
FOB	Free on Board
FURP	Fertilizer Use Recommendation Project
GOK	Government of Kenya
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFDC	International Fertilizer Development Center
IFPRI	International Food Policy Research Institute
IPI	International Potash Institute
IPNI	International Plant Nutrition Institute
ISFM	integrated soil fertility management
K	Potassium
KALRO	Kenya Agricultural Livestock Research Organization
KEBS	Kenya Bureau of Standards
KeFERT	Kenya Fertilizer Roundtable Conference
KFA	Kenya Farmers Association
KICC	Kenyatta International Convention Centre

KIPPRA	Kenya Institute for Public Policy Research and Analysis
KMT	Kenya Market Trust
KSHC	Kenya Soil Health Consortium
KTDA	Kenya Tea Development Agency
MLN	Maize Lethal Narcosis
MoALF&I	Ministry of Agriculture, Livestock, Fisheries and Irrigation
MOP	Muriate of Potash
N	Nitrogen
NAAIAP	National Accelerated Agricultural Inputs Access Programme
NCPB	National Cereals and Produce Board
NGO	Non-Governmental Organization
OAF	One Acre Fund
P	phosphorus
PPD	Public-Private Dialog
PVOC	Pre-Verification of Conformity
SDG	Sustainable Development Goals
SGR	Standard Gauge Railway
SMaRT	Soil testing, Mapping, Recommendations development, and Transfer to farmers
SMEs	Small and Medium Enterprises
SSP	Single Superphosphate
STAK	Seed Trade Association of Kenya
UN	United Nations
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
VAT	Value-Added Tax

Proceedings of the Kenya Fertilizer Roundtable Conference

EXECUTIVE SUMMARY

The Ministry of Agriculture, Livestock, Fisheries & Irrigation in collaboration with key stakeholders organized the Kenya Fertilizer Roundtable Conference (KeFERT) to discuss and formulate practical solutions for improved access and use of quality fertilizers to enhance realization of agricultural productivity envisaged in the Big Four Agenda.

The purpose of the KeFERT conference was in line with the Government's effort to address challenges that hinder increased access and affordability of fertilizers to farmers. The primary objective of the KeFERT conference was to facilitate action on key fertilizer issues through multi-stakeholder dialogue on an ongoing basis.

For efficiency and effectiveness in addressing the prevailing fertilizer issues, coordination of the various multiple fertilizer sector actors is paramount. The key stakeholders include: fertilizer and lime suppliers; policymakers (national and county governments); fertilizer regulatory bodies; laboratory services; experts in geo-statistical information, collection and mapping; development partners; financial institutions (both local and international); research institutions and extension entities both from the public and private sector, among other actors in the fertilizer value chain.

The theme of the KeFERT conference was "**Increasing agricultural productivity through improved access and use of quality fertilizers**". This was addressed through five thematic areas:

1. Fertilizers, soils and crop nutrition under changing climatic conditions;
2. Fertilizer supply chain and usage;
3. Policy, laws and regulations;
4. Financing opportunities and experience learned from other input sectors (capital, seed, agrochemicals); and
5. Way forward – Proposed fertilizer platform

These thematic areas were identified as highly relevant for understanding the major challenges in the fertilizer sector and the development of future enabling policies in development of Kenya's agriculture and economy. Within a thematic area, specific areas were addressed in the form of presentations by a team of professionals in given specific topical areas to give more insights into the challenges and possible solutions. These were followed by a question-and-answer session, and at the end of presentations on each thematic area, there was a plenary session for open discussions.

Experiences from other countries where fertilizer public-private platforms have been formed were shared to address issues related to the sector. This was followed by a presentation on a proposal of a Kenya Fertilizer Public-Private Platform and break-out sessions of various categories of stakeholders represented in the conference to discuss the same. These stakeholders were farmers, researchers, private sector, government and government agencies and county governments.

The outcome of the break-out sessions and feedback sessions, together with the two-day deliberations, formed the Conference Communique presented by the Agriculture Secretary; Ministry of Agriculture, Livestock, Fisheries and Irrigation (Crops Development Department). Below is the Closing Communique of the Kenya Fertilizer Roundtable, KICC, October 16-17, 2018.

1. African green revolution cannot be possible without increased usage of fertilizer to increase productivity.
2. NPK fertilizer is common in Africa but this fertilizer rarely meets complete nutrient requirements.
3. African and Kenyan fertilizer markets are growing rapidly.
4. Agriculture transformation is possible through increased agricultural productivity.
5. Need for climate-smart agriculture and the role of fertilizers is important.
6. Need for right mix of policy to achieve the goals is very important.

Fertilizers, Soils and Crop Nutrition under Changing Climatic Conditions

1. Delivering balanced fertilizer to smallholder farmers needs to be a government priority.
2. Constraints to fertilizer access, including soil testing and mapping, need to be addressed, leading to availability of soil- and crop-specific blends.
3. Soil mapping of Kenya to highlight nutrient deficiencies by crops should be completed.
4. Soil testing methods need harmonization.

5. Soil acidity needs to be addressed through the use of soil amendments (lime) and/or non-acidifying fertilizers.
6. Commercialization of lime, together with demonstrations and extension, should be expanded.
7. Exchange of agronomic and soils information.
8. Harmonization of the tax-exempt code for all agricultural inputs (including lime).

Fertilizer Supply Chain and Usage

1. Price distortion caused by subsidized fertilizer needs to be addressed.
2. Delayed clearance at port needs to be addressed.
3. Non-recognition of COC (certificate of conformity) needs to be addressed through strengthening of PVOC (pre-verification of conformity) at load port in order to avoid re-testing at destination port.
4. Transport infrastructure should be improved (roads and the Standard Gauge Railway [SGR]).
5. National systems for fertilizer quality should be strengthened and establishment of well-equipped permanent inspection teams.
6. Enhance analytical capability of the labs.
7. Training of fertilizer handlers and improvement in storage through the fertilizer chain to maintain fertilizer quality.
8. Capacity of agro-dealers in product information, handling and storage, and extension support should be expanded.
9. Fertilizers to be made available in small-packs for users.
10. Awareness and demonstration of fertilizers and other improved technologies should be enhanced.

Policy, Laws and Regulations

1. There is a need to establish a competitive enabling environment for fertilizer policies and programs.
2. Fertilizer Board needs to be constituted with input from key public and private stakeholders so that it leads to appropriate regulation that balances public and private sector needs.
3. The role of the national government and county governments needs to be harmonized for effective delivery of fertilizers to the farmer.

4. Restructure the subsidy program into a smart subsidy program that does not bypass the private sector. The subsidy program should support a holistic package of support interventions with clear exit strategies.

Financing Opportunities and Experiences Learned from Other Input Sectors

1. Farmer financing of input packages (fertilizers, seeds and chemicals) should be expended, coupled with crop insurance.
2. Financing for hub and retail agro-dealers and other actors in the value chain should be improved.

Proposed Fertilizer Platform

The idea of a Kenya Fertilizer Platform was supported by the stakeholders. The Kenya Fertilizer Roundtable Organizing Committee will constitute the platform as per the feedback from stakeholders during the event to address the challenges by the stakeholders as raised during the conference.

OFFICIAL OPENING

Speech by Hon. Mwangi Kiunjuri, EGH, MGH, Cabinet Secretary Ministry of Agriculture, Livestock, Fisheries & Irrigation

Thank you, the organizers, of this conference, participants, ladies and gentlemen good afternoon. I'm honoured to welcome you to the Fertilizer Roundtable Conference 2018. From the onset, I would like to thank the organizers of the meeting from the Ministry and various stakeholders for planning and making this conference possible. This year's conference is significant in two respects. First, it is happening after an eight years break. The last annual conference was held in 2011. Second, and most important, the conference also assumes greater significance because it is being held at a time when more is being demanded of agriculture in terms of assuring food and nutrition security for all Kenyans, but also for purposes of providing enough agricultural raw materials for agro processing.

Ladies and gentlemen,

Since H.E. the President launched the big four agenda last year, my Ministry has engaged with various stakeholders, farmers, development partners, the business community, universities and the media, to give life and meaning to president's vision and agenda for transforming and modernization of agriculture in Kenya. We are aware of the enormity of the responsibility this agenda imposes on us.

Our presence here today I believe, reflects our collective dedication and belief that the 100% food and nutrition security goal is achievable. One of the key drivers of agriculture transformation is without doubt, productivity. We can increase the land under agriculture only to so much, there is so much more that we can do to raise productivity of the land under cultivation. Fertilizers, both organic and inorganic are key drivers to this endeavour.

Ladies and gentlemen,

This is particularly important when we consider the fact that agricultural productivity must outstrip population growth for it to be meaningful, we must therefore explore all manner of strategies to ensure that the sector increases productivity by a factor a lot higher than population growth.

Further, because of the challenges associated with climate change we need to get smarter. Earlier this month, the UN inter-governmental panel on climate change, and I hope you got

this report, released its climate report that highlights the dire consequences of food security owing to alarming rise of global temperatures. Floods, droughts, and other extreme weather will affect farmers in unprecedented ways unless we act quickly. This therefore means that we cannot achieve food security today, and for the foreseeable future, unless we turn to climate smart agriculture. We therefore must figure out the role the fertilizers in this context will have to play. I therefore expect that this conference will focus on addressing key questions on climate change and constraints related to farmer's access and use of fertilizers and soil amendments.

Soil acidity due to inherent soil factors, fertilizer acidification, and lack of corrective liming suppresses yields in many parts of Kenya. This however needs not be the case; we need to get the right mix of policy options to achieve the necessary balance. Our crop management factors play into yield gaps. Non-use or low rates of use of fertilizer by smallholders is also keeping yields stagnant. Agriculture stakeholders must therefore be concerned that in spite of increase use of fertilizer trends, in the last three years, smallholder farmer's yields remain stagnant, and well below what is obtained by many commercial farmers.

Ladies and gentlemen,

Your discussions in the next two days should therefore seek to resolve yield limiting constraints, develop strategies for increased farmer awareness, propose ways of creating efficient distribution networks, adoption of innovative trends innovation, and inventory management systems in financing key investments that can accelerate the development, distribution and effective usage of better fertilizer and lime products. It is also my expectation that this conference will discuss and reach a consensus on wider policy interventions to address the trends of declining soil fertility in our country, review fertilizer cost reduction strategies, and make recommendations on appropriate use of crop specific fertilizers among other issues.

As I conclude, I would like to appreciate our distinguished sponsors whose contributions have made this conference a success. I wish to single out the following partners for mention. The Saudi Mining Company, Kenya Markets Trust, International Fertilizer Development Centre, Alliance of Green Revolution in Africa, IPNI International, Fertilizer Association of Kenya, among others.

Finally, I have been listening and I want to apologize the Deputy President was not able to come and to be our chief guest today. He was really and willing. There was another round table conference that was going on and the President was participating and therefore we expect the Deputy President also to be around. It got a bit late and as we waited here, the Deputy President asked me to send his apologies. I think I have done the honours. Listening to the proceedings and having been in this field now for a few months, I believe you have been participating in these kinds of conferences, you will agree with me that you have the solutions. You have the solutions to the problems that we are experiencing today.

One of the issues that came out clearly is about information; information sharing and information dissemination. Our farmers continue to suffer not because they have no capacity – let us not always hide behind having capacity. But even the little resources they have, are used in the wrong way. Why? You may even give fertilizers to the farmers for free, but how do they apply it? The farmers can afford lime, some of them can afford lime, but who is advising them on the use of lime? We, as the distributors, as the players, what is our role? What role are we playing collectively or individually?

Number two; the issue of which fertilizer to use. We as some of the market players, be it as sellers or marketers, are we advising those farmers on how to use the same fertilizer? Are we also interested to know whether there is testing, soil testing? Because some farmers could have their soils tested but by the end of the day, do they understand the jargon, and which fertilizer to use? Again, we have the responsibility as market players to ensure that we advise those farmers. Most of you are reaching the villages, you have distributors, you have people on the ground. What are we doing to ensure that we pass this message? I was discussing with Mr. Kamau, the CEO of Kenya Markets Trust, and one of the problems we are having is that that farmer. For example, you want to plant an avocado seedling. You give the same seedling to two different farmers. The two of them will go planting but how are they going to do the planting? One of them was advised on how to do it, how to dig the hole, how to mix manure, how to apply fertilizer, how to ensure there is no flooding. That farmer after three years will start harvesting from that crop. The other farmer just got the seedling and planted it the same way they plant potatoes or maize. Definitely it will wither, it will not germinate, simple logic. I was today morning discussing about poultry farming. About the cost of producing an egg in Kenya and the issue was about chicken feeds. Those farmers can be able to produce protein from their farms because they keep cattle, they can use cow dung to produce [worms]. They

can even be able to produce their own termites in the same farms. They can be shown – you don't need any technology that is new to them – how to go about this. But today, they cannot even be able to make use of the materials they have in their own farms and therefore it is important for us to bridge this gap.

Lastly, it is also good that I have seen in your program that you are going to address the issue of quality of fertilizers. Again, we must sit down and address this issue as players in the market. You know what you are doing. Some us are doing the right thing the others are completely hurting not only the farmer, not only the economy of this country, but the health of the people of this country. When you distribute substandard fertilizer, you are killing Kenyans, and this cannot and must never be accepted. It's about self-conscience – if your fertilizer goes bad or gets spoilt it's your responsibility to withdraw it. Like now, we might have a threat of a shortage of supply because Kenya Bureau of Standards are ensuring that they scrutinize every consignment. Why should we go to this level when we can regulate ourselves? I also believe that during this conference, you should be able to come out with ways of regulating yourselves.

Let of us be able to know what the other person is doing. Why should this not happen? I happen to be a manufacturer of treated poles and we have our own association whereby we agreed, because all of us are giving these poles to Kenya Power, we are not going to allow anyone to be competitive while not using the right standards. And therefore, we have an organization where by one can be able to know whether they are producing the right quality. In the same way we should have other players in the market regulate themselves and not wait for Kenya Bureau of Standards when there is loophole., you explain that loophole not knowing, knowingly that you are killing Kenyans. Anyway, we wish you well, we are going to support you as a government, whenever called upon, we are going to do so. We have heard the cry. We are aware that we should set more funds. It is true that liming is so important for this country – it must be done. It is an awakening call and as a government we'll try to do whatever we can to ensure that we support you as private sector, to be able to venture into this market. But, at the same time we have to get more collaboration, more meetings together, so that we can also advice that farmer accordingly.

With those few remarks, I now take this opportunity to declare this conference officially open.

Keynote Address: Taking Stock from the Abuja Declaration – IFDC President and CEO, Dr. J. Scott Angle

Thank you, it is my pleasure to be here. To the conference committee, Hon. Minister and Cabinet Secretary, and all of our distinguished guests today. I think most of you are familiar with IFDC, as we have been working in Kenya for many years now, and we've had a significant presence over that time.

IFDC is a public international organization whose mission is to enhance the utilization of inputs particularly fertilizers to improve crop productivity and economic viability of our farmers enterprises. The fertilizers, all else being equal; adequate water in the soil, if it's a good climatic and the soil pH ideally at 6.5, good seed genetics, then fertilizers are responsible for 50% of the yield of the crops, and in particular it is also responsible for ensuring adequate nutrition of the humans and animals that will consume those crops. 50% of all crop productivity is developed by the people and those responsible are in this room today.

IFDC has been in Africa, Sub-Saharan Africa, for many years and we have worked in many countries and carried out many projects and it's only a few countries that we have not worked in. For IFDC this all begun, with the Abuja Fertilizer Summit in 2006. This is where most of the countries in sub-Saharan Africa came together and committed themselves to improving agriculture productivity for small holder farmers throughout the continent and they committed to increasing fertilizer use from an average of 8Kg per hectare at that time, to 50Kg per hectare by the year 2015. I will show you in a minute just how far we have gone – I should add that this is kilograms of nutrients not kilograms of product (For those of you who work on kilograms on product you can multiply this number and other numbers that I am using in this presentation by about 2.5). IFDC at that time was appointed by the African Union to undertake technical preparation which included background papers, technical facilitation and preparation of proceedings and again as a result of the summit there was broad agreement to increase fertilizer use on the continent.

There has been a lot of monitoring to assess the progress of the Abuja Declaration in particular the Bill and Melinda Gates Foundation is developing a dashboard literally as we speak to make it easy to assess how much progress has been made. Before the year 2006, fertilizer use was increasing but it was primarily as a result of the increase of land being developed into agricultural production. So, more land, more fertilization – but the rates of

fertilizer use were not going up prior to that time. There are a number of indicators that came out of the Abuja Declaration, some has been achieved while others are yet to be achieved. Some of the positive ones are; distance travelled to purchase fertilizers has vastly reduced, increase in proportion of farmers using chemical fertilizers has vastly improved and introduction of national financing facilities for importers and agro-dealers has also been markedly improved during this time. There are some other indicators that fell in between, such as fertilizer utilization in sub-Saharan Africa for many years since 2000 increased but that increase was primarily due to the increase in land under cultivation, however, around 2012, 2013, 2014, it begun to markedly increase naturally. Relative growth for Africa is expected from the year 2018 to 2021-2022 prediction at 32%, the largest anywhere in the world.

What I would like to point out is that up until the year 2011, the increase basically mimicked the increase that we saw in land under cultivation. That was telling us that it was not the increase in fertilizer use per hectare, but rather the more hectares of land being cultivated during that time frame. But around 2012 things began to change, we started to use more fertilizer on per hectare basis, and the trend continues to escalate all the way up to our predicted values of 2021 and 2022. What that means is farmers are now beginning to intensify agricultural production. More fertilizer use, more crop productivity – more income for farmers is starting to rapidly escalate within this region.

Looking at the continent a little more carefully and closely, we can see that 33% of all the fertilizers used on the continent are used Western Africa region. For Southern Africa it's 34%, for Eastern Africa its 30%, but for Central Africa it remains only about 3%, and frankly that is where many of the problems continue to exist. The four top markets for fertilizers in Africa content are South Africa, Ethiopia, Nigeria, and Kenya at number 4 with 7% of all the fertilizers utilized on the continent. These are all quite significant and frankly we all wish that numbers that we have seen here in Kenya, South Africa and others would be mimicked in some of the other countries. Fertilizer utilization in Kenya between 2015, 2016 and 2017 has gone up by 26% which is a phenomenal increase for any country within the region and I think you have a lot to be proud of as a result of this. It will be difficult to achieve a successful African Green Revolution without the use of more fertilizers and without the smart and proper and appropriate use of these fertilizers.

Fertilizer production and blending capacities are booming on the continent and this region in particular. There is something here also that's important and John Wendt from IFDC alluded to it this morning, much of the focus for the continent has been on nitrogen, phosphorus and potassium and what he demonstrated to you is that there is a lot more to fertilization than just that. We've had many demonstration trials around the continent where appropriately applied adequate amounts of NP&K and there was no response to the crops from those fertilizers. It turned out that other nutrients were needed.

Many African soils as you have also heard this morning are old, where nitrogen, phosphorus and potassium is added, you get a 2.7% metric tons per hectare yield increase, but when you apply secondary micronutrients like zinc, boron, copper maybe even nickel you get another 2.2 metric tons per hectare increase. So, there is a significant increase when those micro nutrients are added to the system.

On average for the continent, a 30% increase will be achieved with the utilization of micronutrients in fertilizer mixtures or blends. We need more fertilizers tailored to specific regions and we need them better tailored to specific crops if the full yield potential of Kenyan agriculture is to be realized. 5% of the fertilizers sold in Kenya contain micronutrients and therefore there is still a lot of room for improvement.

What are Some of the Drivers for Change in Sub-Saharan Africa at least as far as the Fertilizer Industry is Concerned?

There has been tremendous industry interest in Sub-Saharan Africa and this is a change just within the last decade, but more intensively so within the last five years things are changing very quickly. We've got several of the large fertilizer company's distributors, producers here today. There are more who are working on the continent and they see Africa as the next great frontier for their business. Not nearly enough fertilizers as I have demonstrated is utilized on the continent, we are not going to use much more in North America, in Asia, and other parts of the world, it is only Africa where more fertilizer will be needed There is renewed donor interest in the region; USAID, AGRA, Bill & Melinda Gates Foundation, The African Development Bank, The World Bank, Islamic Development Bank, have all realized more recently than not, that fertilizers are one of the most important inputs for crop productivity, and an input that has mostly been ignored until this point. There is a lot of money going into investing in this area.

Subsidies

A lot of subsidies are still present on the continent and utilization has been faster in these countries. Subsidies have a very important role to play in many countries particularly where there is need to use more fertilizer. There is a fertilizer industry association that has been developed in this country and for most countries on the continent and they have become very strong policy advocates to make sure the fertilizers are adequately and appropriately used. Smallholder farmers access to credit has been one of the main limitations for much of agriculture across the continent and organizations such as One Acre Fund and others are doing some fantastic work in this country. The agro food industry and local commodity groups, are helping in making that the farmers have good access to credit. Africa Fertilizer and Agribusiness Partnership (AFAP) one of the sponsoring organizations to this conference is doing great work by specifically targeting the entire fertilizer sector to make sure that farmers have the fertilizer they need to be successful.

What are the Gaps?

There are many strong points that I have just listed, but there are still some areas that need more work – policies and regulations. There is little or no harmonization, in my opinion, of the many guidelines and regulations controlling fertilizer use in each of these countries. We have seen this problem recently where fertilizer product quality is being challenged between one country and the next, between one producer and another. If we could have better harmonization of those policies, it will be a lot easier for the companies to enter and operate these markets.

Farmers anywhere around the world are the same, you've got to show them first before they'll adopt a new technology. There are plenty of farmers in Africa who do not use fertilizers because they do not yet understand the benefits that can be achieved through their use. Subsidies have a very strong role in showing those farmers how fertilizers can markedly enhance both the yield and the quality of their crops. But subsidies need to go from blanket subsidies, which they often start as, to smarter subsidies that are much more targeted to achieve the goals and policies in that country and ultimately to eliminate and have an exit strategy for those subsidies. Never enter into a subsidy unless you have an exit strategy. That is probably one of the biggest problems that national governments are facing now.

Again, I want to emphasize that subsidies are critically important, we can't do without them, but don't get in them and start unless you know what the end game is for them. There is

limited data. How can you coordinate? How can you harmonize without good information? Both for fertilizer use and agro productivity but particularly market data. There is capacity and coordination constraints, both public and within the private sector. There is need for enhanced extension for their ability to deliver information to these farmers who still don't understand some of the needs and some of the practical technologies that could make their lives much better. While there are lots of progress being made, there is still limited trade finance opportunities.

A fertilizer platform, whether it's another Abuja conference, or some other mechanism to bring people together, both the public and private sector to promote the privatization, and the private fertilizer sector, is still needed – here in Kenya and throughout the continent. We've heard a little bit already about the big four, this is something that I am relatively new to, but it's a wonderful commitment by the government to achieve 100% food and nutrition security, and Kenya is well on its way to doing that.

Here are some recommendations, which may also need collaboration with other partners to achieve those goals.

First of all, IFDC design some of the subsidy models. This is an area that IFDC can help with if needed – has set a goal of 50% of all the fertilizers being blended and this would help get some of these micronutrients in them that are limiting yields, and also limiting human health in many of the poor sections of the country.

We heard a lot about liming this morning. This is a critical need throughout most of the countries. We saw that map which was almost alarming in my opinion just how much of the country needs to have more lime before crops can benefit from the fertilizers that are being applied or will be applied in future. Double irrigated crop plan to the year 2022. Improve credit access for markets. Warehouse receipts system for price stability, something also that IFDC works on. Then finally, regulatory enforcement – that is always an issue no matter what country you are in.

For Kenya, the pieces are in place. Let me talk about the pieces that are in place for Kenya and why I'm so optimistic about the country's future and your ability to achieve your goal of 100% food security.

First of all, you do have two quality lime suppliers, most countries don't. You have four quality blenders and one manufacturer, most countries don't. You have competitive quality suppliers of multi nutrient compounds which is necessary to be able to blend them into special fertilizers. A liberalized fertilizer market with over 40 products already available to the farmers. There are so many countries, neighboring Kenya that may have less than a handful of products available. even though their agricultural system is just as diverse as is Kenya's.

A port making it easy to import fertilizer, solid research, whether it's the national government, universities or the private sector – some of the best research work on the continent is being done here and that is what will develop the knowledge to allow farmers to move forward in the future and continue to make a difference. Lastly, you do have outstanding implementing partners like IFDC, AFAP, One Acre Fund and others. A lot of things are working well here, and this is one of the most optimistic position in my opinion for achieving your goal of 100% food security.

On a personal comment, I've worked with IFDC for the last three years, it is an amazing organization that has made a difference here in this country and many others. I'm moving on at the request of President Trump to lead up the research efforts for the U.S. Department of Agriculture. The U.S. Department of Agriculture has a section on foreign research and I'm committing myself to making sure that the United States Department of Agriculture (USDA) will keep the work that is going on here in this country, keep fertilizers in mind, and make sure that we can be a part of the solution in Kenya, for the continent, and for the world.

Thank you very much.

1 INTRODUCTION

There is increasing attention to food and nutrition related outcomes, policies and processes at the national level in the country. The Kenya government has developed “Big Four Agenda" which includes 100% food and nutrition security, along with affordable housing, manufacturing and affordable healthcare, as priorities. Accordingly, the Kenya’s Vision 2030 identifies the agricultural sector as one of the key sectors to deliver the 10% annual growth rate envisaged under the economic pillar. In addition, the Agricultural Sector Development Strategy 2010 -2020 (ASDS), focuses on the challenges of food security, poverty reduction, employment creation, and transforming agriculture from subsistence to farming as a business.

Despite increased fertilizer use trends, smallholder farmer yields remain stagnant and well below what is obtained by many commercial farmers, some of whom are achieving 10-15 Mt/ha maize yields. Overall yield averages have stagnated at 1.7 Mt/ha, indicating low smallholder yields in spite of a 25% increase in fertilizer use from 2014 to 2016. While crop management factors play into this yield gap, non-use or low rates of fertilizer use by smallholders are keeping yields stagnant. Soil acidity, due to inherent soil factors, fertilizer acidification, and lack of corrective liming, further suppresses yields in many parts of Kenya. Smallholders use primarily NP fertilizers on maize (DAP or 23:23:0, CAN, and urea), yet deficiencies of other nutrients including potassium, sulphur, calcium, magnesium, and micronutrients (particularly zinc and boron) are constraining yields. While some Kenyan and international fertilizer companies are producing balanced multi-nutrient fertilizers, no national nutrient deficiency maps exist to assist companies to better develop and target fertilizers according to varying soil and crop requirements.

Unblocking these constraints, providing extension demonstrations and messaging for increasing farmer awareness, developing efficient distribution networks, and financing key investments can accelerate the development and distribution of better fertilizers and lime products. Such an effort requires coordination of the multiple fertilizer sector actors: fertilizer and lime suppliers, policymakers, fertilizer regulatory bodies, laboratory services, experts in geo-statistical information collection and mapping, and research and extension entities, both government and non-government.

To facilitate this coordination, the Ministry of Agriculture & Irrigation in collaboration with the various partners held the Kenya Fertilizer Roundtable Conference, bringing together fertilizer stakeholders.

2 OBJECTIVES

The objective of this roundtable was to review major constraints to farmer access and use of fertilizers and soil amendments (particularly lime) and reach consensus on the need to address these challenges through formation of a multi-disciplinary Kenya Fertilizer Platform. A Fertilizer Platform is a public-private mechanism composed of key stakeholders involved in fertilizer access, quality and use, whose purpose is to resolve issues, facilitate dialogue, coordination and information exchange. The Fertilizer Platform is intended to facilitate action on key fertilizer issues through multi-stakeholder dialogue and public-private task forces on an on-going basis.

3 EXPECTED OUTCOMES

At the end of the conference, participants were expected to have gained an understanding of the multiple challenges to farmer access and use of fertilizers and lime products, and the need to address these challenges in a multi-disciplinary fertilizer platform involving both public and private sector stakeholders.

Such a platform is the proposed Kenya Fertilizer Platform. Participants were expected to reach a consensus on the formation of the proposed Platform, and next steps to its implementation.

In addition, participants were also expected to discus and reached a consensus on policy interventions to address declining soil fertility trend in our country, review fertilizer cost reduction strategy, review fertilizer subsidy policy, advice on appropriate fertilizer recommendations and use of crop specific fertilizers

Participants

Participants were invited from all stakeholders in the fertilizer market sector, including the public sector, private sector, research institutions and development partners. Categories of participants included national government ministries and appropriate institutions, county

governments, farmers and farmer organizations, agro-dealers, extension service providers, research organizations, universities, fertilizer manufacturing companies, international fertilizer-related institutes (IFDC, IPNI, AGRA, AFAP, KMT), the two branches of the national assembly, financial institutions, Kenya Revenue Authority, regulatory bodies and the mass media.

In addition, 12 exhibitors took part. They were Lachlan, ICL, Tegemeo, One Acre Fund, KIPPRA, Mea Ltd, Mavuno, Chemagro Ltd, Ministry of Agriculture, Homalime, Crop Nuts and IFDC.

4 STRUCTURE OF THE ROUNDTABLE

The conference was a two-day event held on the 16th-17th October 2018 at KICC, Nairobi.

It focused on four key thematic areas and a way forward. The thematic areas were:

1. Fertilizers, Soils and Crop Nutrition under Changing Climatic Conditions
2. Fertilizer Supply Chain and Usage
3. Policy, Laws and Regulations
4. Financing Opportunities and Experiences Learned from Other Input Sectors
5. Way Forward

The conference involved four to five structured presentations related to each of the above thematic areas and discussions/plenary sessions on priorities within these themes. The Keynote address was given by the President of IFDC, Dr. Scott Angle. Each thematic area had a keynote speech as well. At the end of the conference four breakout sessions were done to discuss the way forward and next steps towards actualization of the Fertilizer Platform. On the sidelines of the conference stakeholders held an exhibition. Twelve exhibitors took part as mentioned earlier.

5 THEMATIC AREA PRESENTATION AND DISCUSSIONS (SUMMARY)

5.1 Fertilizers, Soils and Crop Nutrition under a Changing Climate

Agricultural productivity in Kenya is characterized by low productivity due to increased soil degradation and decreasing soil fertility as a result of inefficient management of the natural resources. Continuous mono-cropping, inappropriate tillage and poor livestock management practices that characterize farming systems result in high negative nutrient balances, declining yields and increased poverty. Land management strategies that restore and increase the soil nutrient status, improve the physical, chemical and biological properties of the soil, are needed to reverse the disastrous trend and cushion the future viability of the Kenyan food systems.

The current use of an average of 30kg/ha by Kenyan farmers who use fertilizers falls far below the 50kg/ha recommended by the Abuja declaration of 2006. The continuous removal of nutrients without replacement leads to declining soil fertility and yields. Replenishment of soil fertility can be done through the addition of inorganic and organic fertilizers using Integrated Soil Fertility Management (ISFM) approaches. ISFM is a set of agricultural practices adapted to local conditions to maximize the efficiency of nutrient and water use and improve agricultural productivity. ISFM strategies center on the combined use of mineral fertilizers and locally available soil amendments (such as lime and phosphate rock) and organic matter (crop residues, compost and green manure) to replenish lost soil nutrients. This improves both soil quality and the efficiency of fertilizers and other agro-inputs. In addition, ISFM promotes improved germplasm, agroforestry and the use of crop rotation and/or intercropping with legumes (a crop which also improves soil fertility). Farmers who have adopted ISFM technologies have more than doubled their agricultural productivity and increased their farm-level incomes by 20 to 50 percent (World Bank, 2007). The value-cost ratios of adopted ISFM options are well above two (IFDC, 2002).

The main objective of this thematic area was therefore to present the opportunities and constraints for production and delivery of targeted fertilizers and lime products specific to different soils and agro ecologies to meet nutritional requirements of various crops in Kenya.

The main areas of focus of this session was that:

1. Kenya has diverse soils, and there is need to match fertilizers with soil- and crop-specific demands.
2. There is need to determine the extent of soil acidity and lime response in Kenya.
3. Identify fertilizer and lime providers who can address Kenya's need for diverse products.
4. Determine the main soil health constraints and potential solutions for fast impact:
    a. Subsidized NPKs and market competition with balanced fertilizer products.
    b. Constraints and opportunities to getting lime to farmers.
    c. Knowledge gaps in acidity and lime constraints, and different ways to address them.
    d. Extension, subsidy, and marketing support for better fertilizer and lime solutions.

The thematic area on fertilizers, soils and crop nutrition under changing climate had four presentations on:

1. The SMaRT approach: delivering balanced fertilizers to smallholders.
2. An overview of soil fertility and available soil testing programs to develop fertilizer recommendations in Kenya.
3. Overcoming soil acidity and constraints through liming and soil amendments.
4. Embedding information in the agricultural lime distribution chain.

5.1.1 Dr. John Wendt, IFDC, gave a presentation on The SMaRT Approach: Delivering Balanced Fertilizers to Smallholders

The main focus of this presentation was on delivering balanced fertilizer to smallholder farmers. A balanced fertilizer is something that contains more than the NP or NPK. Balanced fertilizer is defined as a material of varying composition added to soil so as to provide essential mineral elements at required levels, improve soil structure, or enhance microbial activity. Crops need many essential nutrients for optimum growth, yield and quality. Nitrogen (N), phosphorus (P), potassium (K), sulphur and zinc are some of the essential plant nutrients. Crops need N, P and K in large amounts, hence these are applied through fertilizers. Application of plant nutrients in optimum ratio and adequate amounts is called "Balanced Fertilization" (International Potash Institute, 2002). Under the big four agenda for 100% food security in Kenya, there is a goal to have 50% of fertilizers blended. The importance of blending is for balanced nutrition in the fertilizers. Crop harvests result in nutrient depletion and there is need to replace these nutrients. Most farmers apply only NPK in their fertilizers with small amounts of secondary and micro nutrients. These nutrients that

include calcium, magnesium, sulphur and micro-nutrients (zinc, boron and others) are very important to plant nutrition and affect crop growth.

Commercial farmers get their soil and plant analysis done coupled with professional recommendation before they buy many bags of fertilizers for their large fields. But the small holder farmer reality is different as many cannot afford soil analysis. They may be growing multiple crops and getting the professional recommendations for all of those nutrients can be a problem. And then when it comes to time to buy their fertilizers, they purchase a few bags therefore smallholder resource poor farmers cannot have a custom-made fertilizer package like large scale farmers. Hence, we recommend a SMaRT approach which involves soil analysis, mapping, development of recommendations and transfer to farmers.

The SMaRT approach is about the soil analysis done on a county-wide and region-wide scale. This approach builds a complete soil analysis to understand all the deficiencies which are then mapped. From these maps, recommendations are developed followed by validation to confirm that these fertilizers work. It is important to develop a fertilizer but also to validate them, to be sure they actually work and that they are actually an improvement. Validation is the economic proof that the formulations are better.

Soil analysis should be the highest quality of complete nutrient analysis that is available because any one nutrient can limit crop yields. Mapping is done to show the geographic distribution of the deficiencies and the acidity constraints. This procedure enables us to develop and target the products.

In developing recommendations, we have to consider that a soil analysis is an indication of a deficiency and not necessarily a prescription. Education and support of the extension services are very important, and they should be facilitated through a fair subsidy environment in those countries where subsidies exist. Small holder famers are very price sensitive and thus if only an NPK fertilizer is being subsidized, there is a disincentive to invest in better fertilizers. The progress in Kenya is that there is a lot of soil analysis, but the maps are generally not available, there are some gaps and many of the analyses are not complete analyses or geo referenced. There are good laboratories and more than 40 fertilizer products available in Kenya but these are still not used widely by small holder farmers. There has been successful validation of some of the products, but it is limited in scale to some areas of the country. There is need for good cooperation between the public and private sectors to create this

enabling environment regarding these subsidies to develop and validate better fertilizers in line with recommendations, and to increase farmer awareness.

During the plenary discussions the issues raised were on the availability / publication of maps. It was noted that there is a gap between the existing maps and making them available to users / implementing partners. The maps are also too general and not nutrient specific. The other issue was the availability of balanced fertilizer and to make sure that farmers are adopting these technologies. There is also a lack of awareness on the benefits of balanced fertilizers and often these fertilizers are too expensive. Smallholders are risk averse and may not be willing to try out new technologies / products.

5.1.2 Dr. Kibunja, KALRO, gave a presentation on An Overview of Soil Fertility and Available Soil Testing Programs to Develop Fertilizer Recommendations in Kenya

The main focus of this presentation was on soil fertility and available soil testing programs to develop fertilizer recommendations in Kenya. Soil testing is concerned with the relationships between the quantity and chemical form of the essential nutrients in the soil and the resulting plant growth. Soil tests, as an aid for estimating available nutrients, have been used for many years. Such tests are empirical and must be correlated with crop response on a large number of soils ranging from low to high levels of available nutrients before they can be used for diagnostic purposes. Both greenhouse and field studies are thus needed to determine the suitability of soil tests. However, field studies are required for calibration of nutrient soil test procedures. Proper field calibration studies require that experiments be conducted on various soils having the full range of available nutrients.

The presenter noted that the productivity of many crop enterprises in Kenya is way below the yield potential. Maize and beans which are our staple crops, have low yields at 1.5 – 2.5 tons per hectare for maize and beans at 300kgs to 500 kgs per hectare. There is a declining trend with a notable yield gap between the researcher managed and farmer managed plots which needs to be closed. There are many underlying problems which include a low soil fertility resource base especially low soil organic carbon, nitrogen, phosphorous, potassium and some micro-nutrients. There are also issues related to poor land and water management where we find that a lot of the soil nutrients are actually being lost from the farm through crop removals, soil erosion, leaching etc. Soil depletion rates range from about 21% of nitrogen which is like a bag of Calcium Ammonium Nitrate (CAN) 8% phosphorous which is about half a bag of Diammonium Phosphate (DAP), and like one and half bags of Muriate of Potash

(MOP) for potassium per year per hectare. There is low fertilizer usage of about 12 to 32 kilos nutrients per hectare per year and of course we have the issue of the low financial ability for our small holder farmers.

The map of Kenya shows 25 soil types with the 10 dominant soils. One of the fertilizer recommendation regimes that we have in the country is what was developed through the Fertilizer Use Recommendation Project (FURP) of 1987-1994 project where 231 site data was collected in Kenya. Generally, the results indicate that more than 80% of the soils have low P with high fixation in most soils. More than 100% of the soils had a pH of less than 7, 65% of the soils are acidic and together with that the soils have very low organic carbon of less than 2% which is the critical level and is also a good indicator of nitrogen deficiency. The results from soil maps show that soil organic matter is easily lost through continuous cropping and may decline by 20% – 50%. The long-term trial at KALRO Kabete shows that in 25 years we lost about 50% of the organic carbon in the soil. However, in the treatments where manure and crop residues were added, the rate of depletion was much less. Fertilizer recommendation have been dominated by N and P. However, there have been responses to potassium fertilizer application on maize in Western Kenya and rice in Mwea. Potassium response studies in Kenya have been conducted in collaboration with the International Potash Institute (IPI). The results indicate a response to addition of potassium fertilizer at 40 kg per hectare in Bungoma and Trans Nzoia for maize. Recent studies in Mwea rice responded to 80 kg of potassium per hectare (Gikonyo et al., 2018).

The government through the State Ministry of Agriculture in a National Accelerated Agricultural Inputs Access Programme (NAAIAP), in preparation for the fertilizer subsidy, carried out soil tests in more than 24 counties and about 40 sub counties in 2014. The results show that in Bungoma, about 27 % of the soils were acidic (below pH 5.2), 100% had low organic carbon and low nitrogen. There are also some zinc deficiencies. Available P was also deficient in most of the counties and potassium, magnesium, copper and iron deficiencies are also common.

Soil testing and plant analysis is very important in fertilizer recommendation development and determination of crop nutrient requirements and lime to be applied. Plant analysis is usually used to monitor whether the fertilization or the liming program is effective according to the soil tests. Plant analysis is also used in the diagnosis of nutrient deficiency towards a robust crop-specific fertilizer recommendation program. There are several soil testing

methods used by private and public laboratories, but we have a dilemma because each laboratory uses different testing methodologies. There is need for harmonization of the methodologies as well as correlation and calibration to internationally accepted standards.

In conclusion there is need to do more soil testing to cover more farms and regions in order to create a robust Kenya soil information database. There is also need to compile the available information that indicates NP and soil organic carbon are the major limiting nutrients. However, more recent testing and filters are showing deficiencies for potassium and magnesium and some micro nutrients like zinc, copper and iron. Information gaps exist on sulphur and some micro nutrients like boron and molybdenum. Crop responses will lead to crop-specific fertilizer and lime recommendations. In addition, there is need to harmonize the soil reporting systems in Kenya. Soil acidity should be managed in areas with soil pH of less than 5.2 and raise soil organic matter to conserve the environment using integrated soil fertility management (ISFM) strategies. Finally, we need to incorporate locally available materials into fertilizer recommendations in order to increase farmer profitability.

During the plenary discussions the issues raised were on the standardization of testing methods and the frequency of soil testing. It was recommended that soil testing should be conducted before every planting season at a regular regime/period of 4 to 5 years.

5.1.3 Dr. Esilaba, KALRO, gave a presentation on Overcoming Soil Acidity and Constraints through Liming and Soil Amendments

This presentation was based on a synthesis of information that is available from Kenya during the last 50 years that was compiled by the Kenya Soil Health Consortium (KSHC). Smallholder farmers' grapple with recurrent food and nutrition insecurity in Kenya. However, the level of food production is mostly constrained by low and declining soil fertility and subsequent acidic soils coupled by climate change. Acidic soils occupy about 13% of the total land area in Kenya and soil acidity is influenced by several factors including organic matter, parent materials, vegetation etc. There are also a number of factors that contribute to soil acidity at farm level where use of acid forming fertilizers and conversion of ammonia to nitrate also contributes to acidity. Soil acidity is one of most yield limiting factors for crop production in the tropics. The degree of acidity is expressed in terms of pH and ranges from 1 to 7. The pH of the soil affects the bio-availability of plant nutrients and so, indirectly, crop plant growth and best range for availability of nutrients is between 5.5 and 7.0. Outside this range, one or more nutrients may become deficient. At low pH levels,

calcium, phosphorus, potassium, magnesium and molybdenum may become deficient, while at high levels above 7.0, iron, manganese, zinc and phosphorus may become deficient. Most acidic soils are found in western Kenya, central Kenya and a small area of the coastal strip. Most soils in western, central and rift valley regions of Kenya predominantly show nitrogen, phosphorus and potassium deficiencies while eastern and coastal region, soils have low zinc levels. Other micro-nutrients have also been reported to be missing in most Kenyan soils. There are also different soil pH requirements of different crops and varieties. For example, for maize the pH is optimum at 5.5 to 7 but for beans it is pH 6 to 6.5. Legacy data available at the Kenya Soil Health Consortium (KSHC) for the last 50 years shows that numerous efforts have been made to counter soil acidity in Kenya. They include: application of lime, use of organic materials, and breeding crop varieties for tolerance to acidity. Thus, many options of increasing food production have been attempted ranging from restoring soil fertility to introduction of improved crop varieties. However, amelioration of acidic soils has not received much needed attention. Within a period of less than a decade, areas previously covered by acidic soils drastically increased (Kanyanjua and Ayaga, 2006; NAAIAP, 2014). This calls for appropriate attention to ameliorate soil acidity in order to maintain good soil health for food and nutrition security. Soil acidity is mainly ameliorated by applying lime or other acid-neutralizing materials. Lime application neutralizes soil acidity, raises soil pH, increases the availability of plants nutrients and adds calcium and magnesium to the soil. It decreases the plant availability of elements such as aluminum and manganese which can be toxic to plants and improves the environment for beneficial soil microorganisms thus promoting a more rapid breakdown of organic materials in the soil, releasing nutrients for growing plants. Liming also promotes nodulation by nitrogen-fixing bacteria in legume crops. Additional data compiled by the Kenya Soil Health Consortium with support from the Alliance for a Green Revolution in Africa (AGRA) on maize grain yields and benefits cost analysis comparing lime and soil health inputs in Western Kenya indicate that the best and highest profit was obtained from liming at four tons per hectare. Lime application at two tons per hectare was the next followed by various fertilizers including Mavuno, DAP, farmyard manure and Minjingu. Organic materials with the resultant organic matter decompositions helps in improving soil acidity. Crop breeding research conducted as part of postgraduate studies at Moi University and various local universities in Kenya have found that there are some acid tolerant crop varieties.

There are various liming materials used internationally to manage soil acidity. One of the most effective one is calcium carbonate whose neutralizing value is 100% followed by dolomitic lime, calcitic lime etc. There are ways to determine lime requirements for acidic soils. Lime basically improves availability of certain nutrients and performance of crops. Challenges of using lime in Kenya include the fact that there is limited knowledge or awareness on lime and resource poor farmers have limited resources to buy lime. The large quantities of lime that are required for application is another problem and also a few agro-dealers stock lime. Lime application is also labour intensive. The conclusions and recommendations are that soil pH is an excellent chemical indicator of soil quality so we recommend that you test your soils before you apply lime. Use of lime will lower soil acidity, however, you need information on the causes of soil acidity, the lime quality, the effectiveness of lime in reducing soil acidity before you use it to improve crop productivity. It is also recommended that you combine lime with inorganic fertilizer.

During the plenary discussions the issues raised were on the commercialization of liming, use of bio fertilizers and lime research and development in Kenya. The participants were pleased that finally liming is recognized by the government as the most effective way of tackling soil acidity. For many years, people have come up with all types of theories, remedies to soil acidity to the extent that one type of fertilizer, DAP, was condemned as the culprit. There is need to focus on how to overcome the challenges of liming. Kenya has large deposits of limestone at Homa Lime Company, and Athi River Mining (ARM)-Mavuno Fertilizers company. Farmers need to be trained on lime. There is also need to make lime application more farmer friendly, cost effective and there is potential for including it in the subsidy program.

5.1.4 Michael Kamau, Kenya Market Trust, gave a presentation on Embedding Information in the Agricultural Lime Distribution Chain

The main focus of this presentation was on embedding information in the agricultural lime distribution chain. Challenges that are affecting productivity in agriculture include: limited access to quality inputs by farmers, extension support, slow adoption of technologies and soil degradation. Kenya Markets Trust conducted an analysis of the agricultural lime distribution chain in Kenya and found that the manufactures are not selling lime to the farmers. There was low demand of agricultural lime among the farmers. There was also limited access to information on soil acidity and availability of lime to the farmers. On the supply side, there is insufficient information on the available products and also weak collaboration between the

actors and the manufacturers going all the way to the distributors and also the stockist on the ground. There are also low incentives to market at smallholder level due to the low demand. Agricultural lime intervention at the Kenya Market Trust (KMT) has three key objectives

1. To enhance awareness on soil acidity.
2. Improve access to agricultural lime through the commercial distribution chain.
3. Strategic partnerships through soil testing and extension services.

KMT has conducted agro dealer training on customer care and business management. Radio promotion was also conducted to enhance awareness through the media and local radio stations. On-farm demonstrations and field days were also conducted to showcase impact of lime on acidic soils. The other activity was improvement of brand awareness and packaging.

The achievements in the four counties that were piloted was the establishment of four distributors with 60 agro-dealers or stockists. For the benefit of lime manufacturers and farmers in Kenya, there was a tenfold growth in a span of less than three years. The outreach was over 50,000 farmers were availed with information on soil acidity and liming and 15,000 farmers bought agricultural lime which resulted in over 50% increase in maize production.

Some of the key lessons learnt was that it is important to leverage on existing input distribution channels to ease entry for new products/services like lime. The other one is that smallholder farmers are willing to pay for a working solution like application of lime for increasing crop productivity. There is also need for more active collaboration between: government and private sector partners, the agro-dealers, and embedded service providers like the soil service, so that they can be able to meet and have a harmonised way of getting this information to the famers.

During the plenary discussions the issues raised were on liming and the soil acidity problem in Kenya. There is need to leverage SMEs on how to make liming more accessible and easier to apply for small-scale farmers.

Conclusions

The session chairperson noted that the big picture that we are dealing with is that our yields are still below two tons per hectare, mostly for the mega food crops, and the fundamental issues are to do with poor soils as well as low fertilizer use. But, it’s not just low fertilizer use but also the inappropriate fertilizers that results in poor crop response even when fertilizers are used by farmers.

The other side of the story is the issue of soil acidity which affects about 13% of our crop production area mostly in the western part of the country as highlighted in one of the presentations. This is a major constraining and limiting factor on crop productivity. Given these key challenges from the issue of soils, there were key points that were raised by presenters. The first issue is the need to have a systematic process for diagnosis of the problem, come up with good prescription and be able to provide solutions to farmers. Dr. John Wendt presented that SMaRT concept which provides the framework for: Soil analysis; Mapping; then Recommendation development; as well as Transferring the technology to the farmers. That systematic process is required for us to come up with workable and effective solutions for the farmers.

Other presentations then highlighted on what has been happening in Kenya, a lot of work has gone into soil mapping, soil analysis, and trying to understand what the key constraints in terms of the soil fertility and soil acidity. We recognize that there is information available but there are major gaps. There is need for coordination and a harmonized way of generating information and putting it together so that we can improve the quality of the information on soils – on which important decisions either by government or fertilizer industry are actually based on. The availability and accessibility of that information is also important in Kenya.

The information should be available in formats that are usable by different stakeholders with an interest in technology development for soil fertility management. There were also two presentations that highlighted the importance of liming for improving the soil conditions and crop yields that farmers are currently achieving. The information on soil acidity and liming is available from past research that points to recommendations of about four tons of lime per hectare which might not be affordable for many small holder farmers. However, economic analysis of past information shows that by targeting an application rate of two tons per hectare, we can actually optimize the cost benefits of liming in many parts of the country. There are also other technologies that we need to accompany liming in an integrated approach that focuses on balancing nutrition and integrated soil fertility management practices that enhance the overall performance of the technologies that farmers use.

The last presentation looked at the value chain and the importance of complete value chain approach in addressing the issue of soil acidity and liming; right from production, engagement of the distribution chain actors including the distributors and agro-dealers, and then transferring the technology to the farmers thereby creating awareness and providing

solutions that work for farmers. The presenter indicated that even though lime is a bulk product it is not easily affordable or easily accessible to farmers. The presentation highlighted that if a technology works and benefits the farmers then they would be willing to make an investment in liming. The knowledge gap is what we need to bridge in as far as providing solutions in liming to farmers. There is an urgent need for all stakeholders to work together to ensure that liming is used in Kenya. In Brazil one of the major investments that they made to improve their overall agriculture productivity is liming in the large areas of the Cerrado grasslands to improve pH and now they can produce very high yields after making mega investments.

To efficiently develop agriculture in Kenya there is need for workable solutions that enable us to address the issue of soil acidity at scale.

Summary of Points Arising and Next Steps

During the plenary discussions the following issues were discussed:

1. Systematic process of diagnosis of acidic soil:
    a. Availability and publication of soil maps.
    b. Availability of balanced fertilizer.
    c. Harmonizing soil testing methods.
    d. Publicizing recommendations – and localising them to include affordable options
2. There is need for scientists, academicians and implementing partners to review and approve recommendations that can be disseminated to farmers.
3. Encouraging use of lime by smallholder farmers and large-scale farmers:
    a. Extension agents should educate farmers on use and challenges of lime on acidic soils.
    b. Educate agro-dealers on the benefits of lime.
    c. Subsidising lime to combat acidic soils.
4. Extension is an important factor in making sure that farmers know the drawbacks of soil acidity and adoption of lime to improve the efficiency of fertilizers in improving crop production.
5. How do we move forward and make sure that soil acidity is tackled?
    a. Create a platform to have this information easily accessible to farmers.

b. Provide inputs and request for support in the emerging tax environment e.g. Calcium carbonate is not considered a nutrient and attracts a 16% VAT, making it less accessible to smallholder farmers.
c. Soil testing services: Testing soils is very expensive, and it was suggested that County governments should subsidize this for smallholder farmers in Kenya.

5.2 Fertilizer Supply Chain and Usage

An efficient fertilizer supply chain ensures that the right fertilizers of the right quality are delivered at the right time or as and when they are required by the users. It also aims at becoming an integrated value chain where each player sees the other as a strategic partner. The objective of this thematic area was to look at the challenges and opportunities for increasing the availability of diverse fertilizer and lime products, reducing input costs, and increasing efficiency of fertilizer supply chains.

5.2.1 Fertilizer Quality and Standards

The Ministry in collaboration with IFDC undertook a fertilizer and standards assessment in 2016. The objective of the assessment was identification of nutrients contained in the fertilizers using the truth-in-labelling principle and verifying the weight of the fertilizer bags. Fertilizers were also tested for: contamination with cadmium; the physical properties of the fertilizers given the very close connection of the physical properties with the chemical properties; and also identification of factors that contribute to fertilizer quality problems. After collection of that data a diagnosis was undertaken to identify, quantify and classify the quality problems and a proposal on corrective actions was made for the different levels along the fertilizer value chain.

The respondents were mainly agro dealers and the process involved fertilizer sampling, chemical analysis, physical analyses and weight of every bag sampled. Data was collected with the purpose of identifying factors in the value chains that have the potential of affecting fertilizer quality, characteristics of the markets, characteristics of the dealers, and characteristics of the storage conditions, and the management in which the fertilizers are moved down the distribution chain.

Factors that influenced the quality of the fertilizers were classified as 1) primary factors being: characteristics of the fertilizers themselves; and the physical and chemical properties of the fertilizers; and 2) secondary factors that had the potential to affect the quality of the products and were basically: the characteristics at different points in the value chain; the

different stakeholders along the distribution chain; and also the characteristics of the regulatory system in place. The problems were classified as: manufacturer problems; management problems; and adulteration problems.

A total of 585 fertilizer samples were collected from 185 agro-dealers. From the exercise it was observed that Urea, DAP; CAN, 23-23-0 and the 17-17-17 accounted for about 94% of the volume of fertilizers traded in the country, indicating a very low variability of products in the fertilizer markets of Kenya. This is an indication that the markets are underdeveloped and far from reaching a status that is ideal. The likely explanation for this is that majority of the farmers have limited knowledge on what to use for their crop, soil and weather.

The level of nutrient shortage was also assessed. Nutrient shortage was defined as nutrients that were below a tolerant limit with the severity of the shortage being an average of those nutrient content values below the tolerant limit. From the fertilizers that are mainly traded in the country DAP nitrogen shortage was witnessed in 37% of the samples and on average the severity of the shortages was minus 4.5% of nitrogen. For 23-23-0, the shortage of P_2O_5 was observed in 23% samples and the severity of P_2O_5 shortages was around minus 4%. For 17-17-17, there were serious shortages for both nitrogen and potassium. 64% of the 17-17-17 samples were deficient in the potassium with an average severity of the potassium shortages around 2.4%. At the time of undertaking the exercise, fertilizer blends were just entering the market and was not possible to get enough samples to make any inference about the quality of those products. Liquid and crystal fertilizers had serious issues in terms of nutrient shortages. The liquids for example had severity of nutrient shortages about four times higher than the granulated products. The crystal products had about two times severities higher than the granulated products.

On physical properties, physical problems were witnessed in the fertilizers that were sampled. The percentage of granules with a particle diameter between one and two millimetres was higher in DAP, 17-17-17 and 23:23:0. The regular size of the granule should be between two or higher than two millimetres in diameter. For dust type of particles whose diameter is lower than one millimetre DAP and CAN showed dust particles in a percentage more than 5%. The other physical problem that was found was caking. Caking resulted from the inappropriate storage conditions in which the fertilizer was kept. There was caking in more than 5% of products that included CAN, DAP, 23-23-0, Urea. On granule degradation, it is suspected that this could have been due to manual and individual handling of the

fertilizer bags where tremendous quantity of force applied broke the granules and degraded the quality of the fertilizers. There was no evidence of fertilizer adulteration in the 50kg bags that were dominant in the country. This was not witnessed either in closed bags or open bags, though there are anecdotal reports that adulteration is present in the fertilizers that are imported under the government subsidy program. At the time of conducting this exercise, there were no fertilizers in any of the NCPB points of distribution. There is therefore a very urgent need of conducting additional sampling and testing of fertilizers distributed under the government subsidy program.

Fertilizer degradation is also affected by conditional storage where some of fertilizers had very high relative humidity. In most of the facilities (65%) had fertilizer that was extremely hard. Relative humidity's was higher than outside. Non-impermeable bags were found in most of the cases with only 5% of the cases had torn bags, there were some bags that had loose seams allowing penetration of moisture. Also the insufficient use of pallets is another factor that contributes to the degradation of physical properties and very high stacks with more than twenty layers of bags is a factor that contributes to the caking of the fertilizers. When the fertilizer granules experience degradation, that means breaking down of the granules or separation of the granules according to size, the nutrients inside the bags are not homogeneously distributed anymore and when they are applied in the field the distribution of the fertilizers on the crop fields is uneven. This results to poor yields.

The main explanations for the nutrient shortages that are found in the fertilizers is actually the official manufacturer of the products. They are manufactured with those nutrient shortages. This problem can be addressed through conducting of adequate inspections at the ports and manufacturing plants of the products that are manufactured locally inside Kenya. The other problem that was noted is that shortages of weight in the bags. Around 40% of the 50Kg bags have weight shortages of half a kilogram.

Cadmium was also found in some DAP samples but those values were on the tolerance limits but there is need to continuously monitor as the high values serves as a warning to continue the inspections and the chemical analysis for cadmium and other heavy metals.

The secondary factors with potential to affect the quality of the products are in the value chain. For example, rural markets have a higher chance of having problems of nutrient shortages than the urban markets. Also, the small retailers that have customers only as

smallholders have a significantly higher frequency for nutrient shortages than any other type of fertilizer dealer.

The main way to correct all these deficiencies in quality is to improve the national regulatory system. There is need to commence the process of reviewing all the documents and improve those deficiencies with respect to the legal terms and the administration components of the documents that support the regulatory system.

The second important improvement in the Kenyan regulatory system is: to put together a technical committee to address problems like the compliance with the label specifications, especially with respect to the secondary and micronutrients; develop tolerant limits for the heavy metal contents; and regulate the registration of new products and the registration of dealers.

Recommendations

There is an urgent need for increased research to come out with fertilizer recommendations for all the specific agro-ecosystems, crops and soils in Kenya in addition to enhancing extension for proper information dissemination.

5.2.2 Constraints and Opportunities of the Kenyan Fertilizer Industry

The fertilizer industry was liberalized around 1990. At that point, the consumption of fertilizer in Kenya was about 200,000 metric tons. After liberalization, the private sector moved the fertilizer consumption from 200,000 to 450,000 metric tons by the time the subsidy program was started in 2009. The fertilizer prices have been steady though in 2008 the price rose from about $400 per metric ton Free on Board (FOB) to about $1,200 per metric ton FOB. To get it to Mombasa it was costing about Kshs. 6,000 ex-warehouse price. The fertilizer prices generally behave just like the oil prices. The Energy Regulatory Commission (ERC) keeps on reviewing the fuel price per dollar, based on the world market price. The private sector in Kenya therefore has no control over fertilizer prices. The price of $1,200 witnessed in 2008/09 lasted for only four months; it occurred in August and in December the price had gone down back to the level of $400. Today, the fertilizer prices, especially for DAP, has been steady and has remained at around $440 – $450 cost and freight to Mombasa. The notion that the private sector is exploiting farmers does therefore not arise.

Currently and based on a study by Tegemeo Institute, there are 16 importers, 500 and about 6,000 retailers. This is an indication that the private sector has the capacity to import and

distribute and make sure that the farmer at the village level receives the fertilizer as opposed to the NCPB depots which are only 110 countrywide.

Constraints Experienced by the Private Sector

1. **Price distortion**. This is brought about by the presence of subsidized fertilizers which sell at half the price. Whereas the subsidized fertilizer sells at Kshs. 1,500 for the 50 kg bag, the commercial price is about Kshs. 3,000.
2. **Sales uncertainty**. The commercial venture by private sector is affected because when the government lands the fertilizer, it has to be exhausted before the farmers can buy from the agro dealers. By this time, the season is midway and the stocks with the private sector are normally carried to the next season tying capital and affecting profitability of the fertilizer business.
3. **Recognition of the Certificate of Conformity (CoC)**. Kenya Bureau of Standards has appointed inspecting agents at the point of loading (Importation). Currently there is a problem of non-recognition of the CoC at the port of destination (Mombasa). The importing Companies are incurring demurrage charges in view of the new practice of testing of fertilizer before it is released from the port. The government needs to address this issue as it has the potential of killing the private sector businesses.
4. **Lack of government support** to local companies that are manufacturing or blending fertilizer. Various Companies have invested in fertilizer manufacturing and blending. Kel Chemicals manufacture Single Superphosphate (SSP) while MEA Ltd, Athi River Mining (ARM) and Toyota Tyusho are blending fertilizers. There is no support that has come from the government. As an incentive, the government should set aside funds to procure these fertilizers in its effort of attaining 100% food and nutrition security and thereby promoting growth of these ventures.
5. **Reliance on rain fed Agriculture**. Our agricultural production relies on rain that sometimes is not reliable. This reduces use of fertilizers. If there are investments in irrigated agriculture to augment rains, this would enhance utilization of fertilizers in the Country.
6. **Inadequate output markets for farm produce**. This is an issue that needs to be urgently addressed. Farmers need ready markets for their produce that can offer competitive produce prices to break even. This will ensure that farmers get good incomes and are motivated to continue farming and even expanding their farming enterprises. Currently, most of the times farmers are not able to sell their produce and there is delayed payment

for maize delivered to the National Cereals and Produce Board (NCPB). The farming enterprise is therefore being viewed as a non-profitable venture. This affects sustainability of production activities and results to reduced utilization of fertilisers.

7. **Limited or lack of communication between the GOK and private sector**. Although the government advertises in the press for supply, the private sector is not privy to actual details of the procurement quantities or what the government wants to bring in. Efforts by FAK Chairman to clarify on the issue have not been fruitful. If the private sector knew what the government was bringing, they would not invest their resources on the same. For example, if the government was bringing a certain quantity of CAN the private sector can avoid importation of the same resulting to glut in the market. Glut would mean the private sector would suffer as they will be forced to carry fertiliser to the following year.

Available Opportunities in the Country to Facilitate Improved Access and Use of Fertilizers

1. Political stability. At the moment the prevailing political climate enables thriving of business as far as the investors are complying with applicable laws.
2. Potential for growth in fertilizer consumption. In the next two to three years, fertilizer consumption is likely to hit the figure of about one million metric tons from the current estimated consumption of 650,000 metric tons. The use of balanced fertilizers that has been embraced by the government for use in specific crops is opening the market for fertilizers.
3. Due to increased soil acidity, there is an opportunity for use of lime or incorporation of lime in fertilizers. This is an opportunity for companies that are specializing in lime to sell their products to deal with this soil acidity.
4. Modern railway network. Continued extension of SGR, enabling transportation to far destinations, will reduce the time and cost of getting fertilizers to the users. For example, SGR can transport 3,000 metric tons overnight as opposed to the current situation where trucks take two to three days to get to western Kenya.
5. Extension of road network. If the envisaged construction of 10,000 kilometres in the next five years is achieved, then players in the fertilizer subsector will be able to deliver fertilisers to where it is required.
6. Vibrant Research Institutions. Presence of agricultural experts in the country is a strength as it facilitates undertaking of appropriate research on fertilizers. The research institutions have the capacity to advice on the fertilizers that are responsive to the

Country needs. The government and the private sector should facilitate these to enhance their research capabilities.

7. Improved coffee prices. The witnessed improvement in coffee prices has created an opportunity for selling of more fertilisers.
8. Presence of blending plants. Currently there are four blending plants in the country, one chemical plant at Thika and one upcoming NPK granulation plant. This means that specific fertilizer requirements can be met.
9. There is an opportunity for investors to invest in fertilizer manufacturing as there is need to produce soil and crop specific fertilisers.

Suggested Way Forward

1. The GOK to consider one of the following: -
   a. Subsidizing all fertilizer imports and setting retail prices, or
   b. Subsidize fertilizer only for small scale farmers who have less than two acres by giving them electronic voucher, or
   c. Withdraw the subsidy programme and purchase cereals on timely basis and at higher prices. If farmers are assured of the market and the payment, they can be able to buy their own fertiliser and be able to produce and sell to the government.
2. The other is for KEBS to recruit reputable PVoC (Pre-Export Verification of Conformity) inspectors at load ports. It is the government to make sure that the fertiliser coming to this country is in conformity with the KEBS specifications.

Fertilizer Cost Build Up

There has been a change in the market from commodity purchasing to development down the value chain in view of players coming into the market. This scenario calls for enhanced integration between the players including manufactures and redefining of roles for the existing players so that they can maintain their market shares. This also takes into cognizance that the government is continually in control of the fertilizer space in the country. The objective of this presentation was to discuss the fertilizer cost chain analysis for the Mombasa corridor.

Kenyan fertilizer market is 20-25% subsidized with the main consuming crops being maize and tea. It's typically a DAP, CAN, market and over the years we have seen the introduction of NPKs and blended fertilizers. Currently, there are four (4) local plants that are providing blended products and adoption of the blended fertilizers is slowly picking in view the well

established distribution channel. The potential for fertilizer consumption is estimated at a million metric tons though currently we are consuming approximately 500 metric tons of fertilizers. The issue at the smallholder level has always been the fluctuating fertilizer prices. From analysis, it has been shown that even if the fertilizer prices in the world market drop, the Kenyan market is not necessarily responding accordingly.

In order to address the issue of the price we need to ask ourselves; what are the key areas we need to look at when we are talking about costs across the value chain? We need to focus on the field of manufacturing, logistics, and then margins to address costs.

On manufacturing, there is the issue of cost of production. Currently all products that come into the country are internationally manufactured and the question we are asking ourselves as a country is whether we can locally produce fertilizers in addition to the current blending that is going on in the Country? Do we have the requisite resources to manufacture fertilizers? That has been found not to be feasible and we are stuck with the only option of importing manufactured fertilizers.

For logistics, the international freights and their costs are more or less standard leaving no opportunity for us to manipulate. That leaves us with the local transportation. We have to look at the cost implications of moving products locally from port to farmer and, availability and efficiency of our systems. Those are the deciding factors on cost implications on fertilizers.

On margins, we need to ask ourselves the following questions: Do we have a competitive environment as it stands? What is the number of players along the value chain? This includes importers, distributors, wholesalers' and agro-dealers. This will assist in understanding how the businesses can remain profitable and at the same time deliver the fertilizers at a price that ensures, and guarantees, a good return on investment to the farmer.

With the above considerations, we can at the port of Mombasa. Fertilizer discharge at the port of Mombasa is at the rate of 2,000 to 3,000 metric tons per day and therefore takes five to eight days to discharge 25,000 metric tons of products. However, if we discharge bulk on truck it will take approximately 4,000 to 6,000 metric tons per day. It is therefore imperative to see how efficiency at the port can be increased as there are some charges that cannot be avoided. There are some projects that are coming up at the port and aimed at increasing efficiency. These include building of new berths and it is expected that three berths will soon

be available. Plans are also on course to extend SGR (Standard Gauge Railway) into the port so that cargo can be put on trains directly instead of moving it to holding grounds as it awaits loading to Nairobi. These measures are aimed at improving the efficiency but there is still a cost of approximately $80 – $90 per ton to move the product through the port of Mombasa.

There are three (3) main modes of delivering imported fertilizer to the farmer. These include government subsidy programs that are made at the national and county governments. The National Government program is typically administered through the National Cereals and Produce Board (NCPB) direct to farmers. The second is the integrated system which has independent players who are importers, wholesalers and retailers. The third is the commodity-based system of distribution which is an input credit output system and is mainly run by the Kenya Tea Development Agency (KTDA) and One Acre Fund. For the integrated system that moves most of the fertilizers to the farmers, the issues that need to be addressed hinge around distribution and accessibility. The longer the value chains the more the additional costs of the fertilizer and ultimate cost to the farmer. The desire should be to make the value chain shorter thereby delivering the fertilizer to the farmers at a cheaper price.

In summary, the price element is a logistics game. We pay $15 to $25 per ton to freight product to Mombasa. But then, we are required to pay $80 to $90 per ton to move the product across the port of Mombasa. This is compared to Durban where they only pay $40 to move the same amount of product. The question is; can we possibly be able to reduce the cost of moving products across the port and the additional cost of $50 to $60 per ton to transport product upcountry? How can we resolve the new development where product is being held either at Mombasa or Nairobi for two weeks for testing resulting to incurring of demurrage? Demurrage is estimated at approximately $10,000 a day. If we have delays of 10 to 15 days, that is an additional $150,000 that is added to the fertilizer. The only one person who bears all these costs is the farmer. Then can we truly lower fertilizer prices? The short answer would be yes, but a lot of areas have to be looked into just to try and get an efficient distribution system so that the farmer gains at the end of the day.

Fertilizer and Role of Agro-Dealers

Agro-dealers are businesses that are involved in supplying agricultural inputs and farming technologies to farmers. In Kenya, the businesses are either sole proprietorship or family owned businesses and this has an implication when it comes to issues like accessing finance. Finance is a major constraint in the fertilizer sector as it affects the ability to procure as

fertilizer is a high money commodity. This structure of ownership makes it difficult to access finance as the formal banking sector considers them to be risky clients. Other than the sole proprietorship and family businesses, there are businesses that are large while others are community and society owned.

In Kenya, we have approximately 12,000 agro dealers. Structuring the agro-dealership is difficult as we have the small businesses, seasonal, mixed businesses, hardware that stock fertilizer, and even supermarkets dealing with fertilizer. It's again a very gray area when you are talking about numbers. Who are the pure agro-dealers? You'll go to a chemist to buy your cough medicine and you might find seed there. You might find people who are mixing it up with different kinds of businesses. We estimate about 12,000 and the capital range, Kshs. 50,000 looks high. Some of them start as low as Kshs. 20,000 to 30,000, with big ones of up to Kshs. five million.

From the estimates, 67% of farmers get their fertilizers from agro-dealers. This is significant because agro dealers are found even in small towns in the rural areas. Farmers buy what is available in these agro dealer businesses with their choices limited. This is a challenge as when we talk about fertilizer blends or other fertilizers that are required there is a probability that they are not stocked by the rural agro dealers.

The other important aspect is that up to 32% of farmers get information from agro-dealers. AGMARK has facilitated the agro dealers with a lot of information to enhance their ability in serving famers. However, it is important for the conference to come up with effective channels for agro dealers to get the information, knowledge and skills since they are not agronomists or extension agents. Information dissemination is a key role that is played by the agro dealers. As we interact with many of these agro-dealers, we may ask, how many fertilizer blends are they stocking or from how many different companies? Many of the agro dealers will say one. The question is; how do we make it more competitive, and bring in other companies so that the farmer at least has a choice.

The Experience of an Agro-Dealer

Mr Odongo is an agro dealer based in small Ahero town of Kisumu County. He started a few years ago as a small agro dealer with support from a program sponsored by AGRA. He has grown into a large agro dealer and he is now a supplier and a distributor. As an agro-dealer he

considers himself as an important link between the manufacturer and the farmer. Within the course of doing business, he has faced challenges that include:

1. Access to information. Information is important in enhancing the ability to give better services and advice to farmers. Currently, technologies are continuously being developed and one needs to keep up with the new developments. There is need for a real-time mechanism that is interactive to be developed to enable the agro dealers pass the latest technologies to farmers as they are part of the extension system. Currently the coping mechanism is formation of agro dealer associations in every county under the support of Kenya Markets Trust (KMT) and Agricultural Market Development Trust (AGMARK).
2. Access to affordable credit. The technologies that are coming up require an enhanced capital base to ensure that the agro dealers are able to stock and pass them on to the rural agro dealers. Due to limited capital and access to affordable credit, the agro dealer is not able to take up these technologies. For example, we have been discussing about Mavuno fertilizer blends but it is difficult without capital to stock the fertilizer. There is therefore a need to see how best the agro dealer can be assimilated for effective transfer of these technologies. Once the issue of capital is addressed, it will ensure that the agro dealers are continuously in business and not on seasonality basis.
3. Poor sector regulation.
4. Limited capacity on use of IT in stock management. Information technology is important as it can facilitate the Agro-dealer in tracking stock movement and in timely money restock once the economic order quantity is reached. Due to limited ICT capacity, a number of agro dealers rely on physical counting and in most cases are caught up in a situation where a certain fertilizer is finished without knowing. In this scenario a farmer is made to buy what is available but not what they wanted. It is imperative that the big companies support the agro dealers towards attaining ICT capabilities in order to be able to efficiently monitor stock levels.
5. Policies that do not facilitate business. Currently, the National Government is offering fertilizer subsidy to farmers through the National Cereals and Produce Board (NCPB) while county government do it through their Sub County officers, the agro dealers are left out yet they are the ones that pay licenses. There is need to involve the agro dealers in the subsidy programs and a clear exit strategy should be developed for these subsidy programs. Another proposal is to involve the agro dealers in setting the price in addition to allowing them to buy from National Cereals and Produce Board. For example, agro-

dealers can be allowed to buy DAP from cereals board at Kshs. 1,500 or at Kshs. 1,600, and they load an extra Kshs. 200 to acter for transport and other logistics.

In summary, agro-dealers need support to be part of the distribution chain whereby if you are organizing subsidy, let agro-dealers be part of that subsidy. For example, if Trans Nzoia County government is bringing fertilizer to the farmers, it should identify a mega agro dealer, fix the retail price and the trader mark up. This will eliminate unscrupulous traders who buy and rebag subsidy fertilizers or adulterate fertilizers for personal gain. Let's bring agro-dealers in the process and we'll build our country.

Soil Fertility Challenges – The Farmer Experience

Despite the need for enhanced productivity, there are still low levels of fertilizer use among the farmers of Kenya. This is attributed to farmers' experiences revolving around challenges in accessibility, affordability of the fertilizers, adulterated/contaminated fertilizer, poor enterprise choice, supporting environment to production and the farmers' knowledge on correct type and fertilizer application.

i. Accessibility

A number of factors affect accessibility to fertilizer by farmers. These include:

a. Long distances to points of sale to acquire fertilizer that lead to additional cost of transportation;
b. Fertilizer packaging that is not responsive to the requirements for smaller land sizes. For example, Packaging of fertilizer in 50Kg bag is not ideal for farmers with small land sizes – projected average, that is (50Kg/ha) and the fact that many (over 30%) of the farmers operate on less than one acre of land means fertilizer is out of their reach. This leaves farmers with the option of buying repackaged fertilizers in the open market thereby subjecting them to the prospects of adulterated fertilizers.
c. Supply timelines of subsidized fertilizer against natural weather conditions. Supply delays means planting delays or lack of fertilizer usage. Access procedure for subsidized fertilizer is very long and cumbersome with most farmers shunning it.

ii. Affordability

Despite government efforts, affordability of fertilizer remains a challenge for most small-scale farmers. Majority of the Kenyan smallholder farmers are resource poor and cannot afford the recommended amount of fertilizer per unit size of land. Unsubsidized 50Kg

fertilizer goes for an average Kshs. 3,000 and can cost even more depending on distance from the port. There is need to standardize the cost of fertilizer with a view to making it more affordable to the smallholder farmers. In addition, farmers should be organized into groups that can procure inputs together to enjoy economies of scale.

iii. Adulterated or Contaminated Fertilizer

The opening of fertilizers by traders abets fertilizer adulteration/contamination. The combination of adulterated inputs, that is fertilizer, seed, pesticides, translates to extremely low productivity and depressed incomes for farmers. Further, traders exploit famers when it comes to pricing of the "*kipimo*" fertilizer meaning it costs the farmer more than buying the 50Kg bag.

iv. Farmers Knowledge the Correct Use and Application of Fertilizer

Lack of knowledge on the correct use and application of fertilizer is widespread especially among the small-scale farmers. Farmers have a fixed mindset on certain fertilizer brands and types, which may not necessarily be correct. For example, in North Rift, if a farmer does not get DAP then he has not gotten fertilizer regardless of soil test results. Majority of farmers have little knowledge on their soil status and, use and application of balanced fertilizers. Extension services should be enhanced to support capacity building for farmers.

v. Profitability of Enterprise Choice

Poor enterprise choice due to lack of information and lack of entrepreneurial mindset results poor returns for farmers. Lack of market survey before production leads to production of crops whose demand is low and therefore less ability to negotiate for better prices. The poor prices and low incomes results to low motivation for the farmers to invest in fertilizers and other inputs. Farmers should also be cushioned against natural disasters like fall army worm, drought etc.

vi. Delayed Payments for Farmers' Produce

Due to better maize prices, a number of farmers deliver their produce to National Cereals and Produce Board (NCPB). Majority of these farmers rely on payments from the board for acquisition of their inputs. Currently, there has been a delay in payment of farmers reducing their ability to procure fertilizers for use in subsequent crop production.

Plenary

This session was conducted by the Chairperson with participants fielding questions and the facilitators responding appropriately based on the topic covered. The questions and responses are as detailed below:

Question 1: How much is the government allocating for fertilizer importation and how much was imported through the subsidy program in 2017/18 financial year?

Response: The current market share under subsidy program is 25%. Under the Subsidy program, approximately 150,000 metric tons of assorted fertilizers were purchased in 2017/2018 financial year. Overall, there was an increase of imports with an estimated 860,000 metric tons of fertilizer brought in the same year.

Question 2: What circumstances occasioned the change in policy, analytical policy that is causing this excessive demurrage expenses?

Response: It has everything to do with quality – there have been questions raised on the quality of fertilizer coming into the country. There is also the fact that we have a slow process of testing our products that takes a minimum of two weeks to get results. Right now a higher percentage of the products must be tested at the port before releasing into the market and that brought on the 14 day demurrage that importers are incurring.

Follow-up Comment 1:

Why all of a sudden this law was imposed of testing everything? From the importers, they forced to charge the farmer more for the fertilizer because they are incurring very high demurrages charges. And then there is the waiver policy, I don't know when it will be waived and how it will be done, how many months it will take. The whole economy is suffering, not to the dealers or distributors for the fertilizers even for the chemicals it is remaining the same. Even for something like polythene and shade nets, where testing equipments are not available, dealers are being made to incur demurrage charges as well. Are the fertilizers being dealt with on a FIFO basis, or how have they been categorized?

Follow-up Comment 2:

Thank you very much, Grace I think you talked of two weeks to get the results. But our experience is about six weeks to two months to get back the results, it is that serious. As you put it there you are paying Kshs. one million per day because they even say, if the cargo is on the vessel, the vessel has to remain at the berth until they get the results. And as I said earlier, there are the same people who tested the product at load port, and now they are saying it's not compliant. We don't understand what is happening.

Follow-up Comment 3:

This issue with the KEBS testing is a really serious issue. It not only affects demurrage and the cost, the current impositions being put on the flower sector, from not having something like calcium nitrate will affect their export markets. While we can take it lightly, this is what this group should be doing, it should be hammering this home to get change. It's unacceptable in this day and age to have products being held at the port. For many of the containers, they have been lying at the port for the last 60 days now. This is just not acceptable and it's going to affect some of the export industry. What I'm trying to say here is the idea of bringing this group of people together, was to bring a range of different stakeholders from the fertilizer sector, where we can discuss openly and find good outcomes to prevent this sort of this happening. Not just one group against another but all come together for the benefit of the nation. I hope you keep that in mind when we go forward, and where we take this process.

Comment: Okay thank you very much. I just wanted to add a point and this concerns the importers and the distributors of fertilizer. You realize when the polythene was banned in Kenya most of us agro-dealers have faced a challenge because most of our farmers normally buy small scale like one two kilos and we need to; sometimes it forces us to repack for them. I would really request the fertilizer companies to come up with smaller package. I know they might be there in the market but they are not distributed to other parts of the country. Like where I come from, the least package you get is 10kgs. The smaller,

farmers who cannot afford smaller packages cannot get what they want. It's my appeal so that we can make all the farmers get what they want.

Comment: Okay thank you. My name if Frescia Mwobia, I sit in the climate change unit in the crop development state department, in the Ministry of Agriculture Livestock, Fisheries and Irrigation. I want to echo what the stockiest has said because in the development of climate smart agriculture implementation frame work for Kenya, when we engaged with CSO's and the private sector, that issue came out very strongly. The issue of engagement with the distribution networks in the private sector that is the stockists, the distributors for the fertilizers, and the rest. Because of the issues of efficiency, they felt and there was also some evidence given that that part of the private sector has some efficiency, such that if they know what they ought to do, like one of the speakers early in the morning said, if they know what the government is doing, then they will be able to come in and see what they can do. Being in the private sector, there is some efficiency in terms of time and in terms of…, there is also a good distribution network of the distributors, the wholesalers and even the retailers, ensuring that farmers in all corners of the country are well reached by not only by fertilizers but also other farm inputs. There was also the issue that my colleague has just talked about, the smaller packages. There was a wish that all the fertilizer blends can be repackaged 50Kg, 25Kg, 10Kg, even 5Kg, and 1Kg, because the smallholder farmer most of them have small pieces of land and they also need to be in production.

Comment: This story of agro dealer has been there for a very long time since 1970, I think even in 60's. From the presentation made, it is clear 67% of small farmers particularly depend on agro-dealers for their supply of their inputs. That underlines the importance of the agro dealer. Agro dealer is like the petrol station for the motorists. Agro dealer has to stock the fertilizers for the farmer. I suggest that there be a deliberate effort to build the capacity at agro dealer level not only in the following form, training, and training to agro-dealers which AGMARK is already doing. I commend that. I have always wondered, when I left university some many years ago it was very special because you had to go direct to the Ministry and get a job immediately. But

recently I have met tax drivers who are trained as agricultural graduates. I have met people trained at certificate or diploma level, floating around town looking for jobs. Why can we not have a special arrangement as a matter of policy to assist these well trained agriculturalists if I may call them to set up shops at agro dealer level? If I ask them why don't you set up some shop so that you can sell to the farmer? I have no money – that is the credit or finance he was talking about. It not easy just to go to the bank and say I would like to have money to stock fertilizers. Why? Banks will give you money if you are stocking sugar, if you are stocking salt, if you are stocking grocery that move fast. The risk they see in fertilizer is very high. I recall there was a policy, and IMF will probably oppose this that banks had to lend a certain percentage of their lending to agriculture. Would it be possible to have a system or some regulation to ask banks to support agriculture, then they will tell you its very risky. But then, here is where the government should come in and underwrite a certain percentage of default level. I think there was something called *kilimo biashara*; I don't know if it still exists, which attempted to do this.

Having said that therefore, if we have to get the farmers to use the fertilizer and to use it properly we must build that capacity. We must not leave it to the private sector alone it must be a national government policy. Ministry of agriculture you have the challenge to do this, if we want fertilizers to reach the farmer. Private sector is playing their role now. They supply agro-dealers with fertilizers at great risk, at times post-dated cheques which they do not know if they will go through or not. Mr. Muriuki, Mr. Jiten Patel (InterAgro (K) Ltd), can tell you the tribulations they have with credit to agro-dealers. This is a challenge and I believe we should come up with what we call at the end of this meeting with a recommendation or declaration on how to meet the challenges of agro-dealers.

Comment: From the discussion and from what the agro dealer Mr. Kuto has talked about. It has come out so clearly the role of the County governments in this fertilizer business. Actually looking clearly I think the County governments now it seems it's their role to partner with agro-dealers to do soil testing, to help them even train them, so that most of them they become extension officers at the

ground. And, the County governments now to establish silos to help store fertilizer on behalf of these farmers, or on behalf of the agro-dealers, so that it can be quickly supplied in the community during planting season. Another thing I have noted someone discussed about the financial constraints. We should not reinvent the wheel when we already have one. I understand that financing agriculture is too risky by the commercial financial sector players, the banks. The government of Kenya has a specialized institution, Agricultural Finance Corporation (AFC). Why doesn't the government now, build that institution so that it may move more efficiently provide finances to farmers? What is so hard for example for the government asking all these farmers to go to the institutions? There are agricultural finance institutions for the loaning and help them in getting fertilizer.

Comment: We need to look at the policy structure as at the end of the day, it's the small farmer who is suffering. When the fertilizer distribution structure is long, the whole cost that is generated is loaded onto to him. Number two on subsidy fertilizer, both county government and the national government must come up with an appropriate access structure as the small-scale farmers spend a lot of time going to the National Cereals and Produce Board and at the end, they miss the fertilizer due to the high demand or there is delay in accessing. We all know delay in planting occasion's poor productivity. We need to come up with a policy and also restructuring of the program in order to help these small-scale farmers.

Comment: The efficient use of fertilizers is hinged to soil testing. When you have laboratories which can test the same soil and give different results, you can see now the quagmire that surrounds the small scale and the large scale farmers. There should be an accreditation system for laboratories, so that they can give a clear diagnosis like the case of Kenya National Accreditation System (KENAS). That is one which can be mandated to bring sanity into this soil testing laboratories.

Comment: My name is Anthony Njogu. I'm an agro dealer in Embu County and I'm also the secretary of Embu Agro-dealers Association and we feel we are part of the distributorship of fertilizers. Actually, if you check from the agro chemical

site, they have been training us to be able to reach the farmers far much faster. We feel that as the agro-dealers associations we are a good alternative for extension provision. In Embu, we have 92 agro dealer outlets already registered with the association and an average of four (4) agro dealers in each of the 24 wards. We can confidently see ourselves as the alternative in advising of farmers as the number of extension officers declines. I don't know how the County government, or the Council of governors can recognize us because even in college when doing a Bsc. there is nowhere the word agro dealer appears in the training courses in our universities. The Council of governors should recognize the agro dealer associations in each County because they can be very useful in extension provision. The agro dealers have been very useful in implementation of programs such as NAAIAP which was the first one to deliver subsidized inputs. The council of governors should instruct the governors to recognize, capacity build and involve the agro dealer associations in their programs.

Comment: I'm Beatrice Okello from Kisumu County. I'm also an agro dealer and belong to Kisumu County Agro Dealer Association. When we are discussing about fertilizers, and the use of fertilizers, this is the appropriate use of fertilizer to the farmers. The first thing that we have to talk about is the knowledge on fertilizer. How much do we know about fertilizers? This is important as you have to demonstrate to them that you are knowledgeable about the product. This is the only way to earn their trust and make sales. The agro dealer subsector has many challenges as have been mentioned here but there is need to stress on the policy issues. For example, the Kenya Veterinary Board has formed an association that is now dealing with issues of professionalism. Professionalism is something that is missing in the agriculture part, the agro part as you find unscrupulous dealers coming in and selling fertilizer and they don't even know the content of the fertilizer, they don't know how to advice the customer who is the farmer. The farmer will only appreciate when the yields have improved and marketing of produce has been done in the right way. The question that we should be asking ourselves is what is the government doing in terms of addressing the marketing of produce? Because the agro dealer association is open to all fertilizer companies, it is always an

appropriate avenue for them to get into the Counties. Stakeholders can come through the agro dealer associations and train the agro-dealers, pass messages on the latest developments through the agro dealer networks and scheduled meetings. All the Companies should give their contacts so that they can be invited in the various agro dealers' forums.

5.3 Policy, Laws and Regulations

Soils in Kenya have rapidly been declining in soil fertility due to several factors; soil degradation compounds the situation due to poor land management. Despite the critical role that soils play in the production cycle, there is no policy to guide on proper use, management, restoration and conservation of agricultural soils. In addition, the existing laws and legislation are inadequate and coupled by poor enforcement. It is therefore with this background, that this session's objective was to provide an overview on the current policies and regulations relating to fertilizer industry, articulate the constraints and propose solutions to facilitate creation of a competitive enabling environment.

Specifically:

i. Taxation, trade restriction, and lack of stand-alone fertilizer policy to govern the sector (unstable policy environment)
ii. Which roles/actions should the public sector undertake in the fertilizer value chain?
iii. Which roles/actions should be left to the private sector?
iv. Management of the subsidy programs: Lessons from other countries that perform similar programs.

5.3.1 Session Keynote: Current Policies, Laws, Regulations and Standards Governing the Fertilizer Sector in Kenya

The session started with a keynote presentation by the Agriculture Secretary Ms. Ann Onyango titled 'Current Policies, Laws, Regulations and Standards Governing the Fertilizer Sector in Kenya'. The presentation provided insights into the different legislations relevant to the industry namely; the Fertilizer and Animal Feed Stuff Act (Cap. 345) (1967), amended in 2015 to create a Fertilizer and Animal's Feeds Stuff Board of Kenya; the Standards Act (Cap. 496) (1977) in regards to the minimum quality standards for fertiliser, the Kenya Plant Health Inspectorate Services (KEPHIS) Act 2011 which allows the Kenya Plant Health Inspectorate Services to establish laboratories for the purpose of monitoring the quality and

levels of toxic residues in agro-inputs, irrigation motor, plants, soils and produce; and finally, the Anti-Counterfeit Act (2008).

Regarding policy, the issues of fertilizers and other farm inputs for food production are outlined in the following policy documents, namely; the Kenya Vision 2030 under the economic pillar- Agriculture identifies the Three Tier Fertilizer Cost Reduction Strategy as a flagship project. The strategy focuses on three areas: bulk procurement, blending and local fertilizer manufacture. The bulk procurement endeavours to achieve economies of scale, this is already working in the tea and the cooperative sub-sectors. In terms of blending, Toyota Tsusho has established a fertilizer blending plant in Eldoret. This is in addition to several other fertilizer blending factories that exist in the county.

The agriculture sector growth and transformation strategy recognise the importance of fertilizer in production. The 'Big four Agenda' targets to achieve 100% food security, therefore in the execution plan includes the use of locally blended fertilizer on a 50-50 basis and re-designing the subsidy model in order to achieve maximize impact. This would be done using an e-voucher system that is flexible and incentive-based.

The draft National Agricultural Soil Management Policy was presented, it has been discussed by a wide spectrum of stakeholders and is currently going through the legislative process. The policy emphasizes issues on sustainable agricultural land management, soil management, environmental issues, technology development, dissemination and utilization, in addition to fertilizer development and investments.

Section 2 of Cap. 345 of the Fertilizers and Animal Foodstuffs (Amendment) Act was amended by providing for the establishment of the fertilizer and animal foodstuffs board of Kenya. The commencement date was 26th October 2015. It envisioned that the board will provide guidance in regulating the fertilizer and animal foodstuffs industry including production, manufacture, packaging, importation and marketing of fertilizers and animal foodstuffs. In addition the board was to: inspect and test fertilizers and animal foodstuffs to ensure their quality and safety; license manufacturers, distributors and retailers of fertilizers and animal foodstuffs, on the recommendation of the Director of Agriculture and the Director of Veterinary Services; promote, collaboration with stakeholders in the agriculture industry research on fertilizer and animal foodstuff; and also ensure that the fertilizer and animal

foodstuff imported, manufactured or distributed in Kenya, meets the standards of quality and safety as prescribed by the law.

Some of the challenges highlighted by the presenter include;

i. Inadequate raw materials for local manufacture of fertilizers,
ii. The Act does not address the biological and organic fertilizers,
iii. Inadequate capacity for fertilizer quality assurance and analysis including laboratories, equipment and personnel,
iv. Inadequate capacity in terms of infrastructure and personnel for soil analysis,
v. High cost of fertilizers associated to infrastructure.

Questions and Answers from the Floor

A participant made a comment on the proposed fertilizer board stating that there was a risk of having an over-regulated fertilizer industry with the board present. With a rogue board in place, there is the possibility of the activities of the private sector being hampered leading to shortages and reduced usage of fertilizers. Another question from the floor was an enquiry on when the fertilizer board will be in place. The response was that after the regulations were in place the board would be appointed by the Cabinet Secretary.

5.3.2 Experience of Counties in Soil Fertility Management-Programmes and Regulations

The 'Experience of Counties in Soil fertility management-programmes and regulations' was presented by Hon Mary Nzomo County Executive Committee Member, Transnzoia County. The forum was reminded that agriculture is a fully devolved function, where counties were involved in implementation while the role of policy, capacity building and control of imports and exports are functions of the national government.

Soil fertility and agriculture productivity in Kenya has been declining over the years. An example was given of *Transnzoia* county where maize production has declined from 30 -40 bags per acre in the 1980's to average of 12 -15 bags per acre by 2013. This trend is also true for other crops. The County government's key development priority has been to reverse the declining production, increase productivity and enhance farmer's incomes.

Food and nutrition security is a function of both the National and County Governments. In this regard, the County government has made investments in providing subsidies to address the high cost of farm inputs and optimize their use. In addition, several counties are assisting

their farmers to carry out soil sampling and testing to establish soil nutritional status free of charge.

Other programs related to soil health management include; the fertilizer cost reduction program and providing region specific fertiliser which is targeted to the small holder farmers with less than five acres. It was reported that there are emerging fertiliser blends in the market which are able to restore the depleted meso and micronutrients which are absent in most of the fertilizers that have been existing in the market. These blends have less acidifying effects to the soils compared to the commonly used planting fertilizer.

To complement the subsidy program, capacity building and sensitization on integrated soil health is also carried out in order to encourage the farmers to use other fertilizers other than the traditional types of fertilizer.

The counties are also implementing liming programs to raise the soil pH, in addition to technologies such as conservation agriculture**,** where investment have been made to provide appropriate equipment. Some county officials have also been exposed to technologies from countries like Argentina in South America which have more experience in conservation agriculture.

Some of the conservation agriculture technologies that are being used in Transnzoia County include; (i) biological seed dressers from a company called Rizobacter where with the use of *rizofos,* farmers were able to register an increase between three to five bags per acre by just spending KShs. 1,500 to use that technology, (ii) Bio-fertilizers and foliar feeds, (iii) Manure application to increase organic carbon content in the soils.

The programs that the counties have implemented have recorded positive results namely: the fertilizer subsidy and optimal use of fertilizer has been enhanced and production levels for instance maize production has increased from an average of 12-15 bags in 2013 to over 20 bags per acre in the major maize production counties thus increasing household food security and reduction of poverty due to increased earnings.

The use of fertilizer blends has tremendously improved the soil nutrients status on the farms where they've been used. Counties have moved from where one-fit-for-all fertilizer and are now using fertilizers that are specifically blended for the counties. For instance, *Transnzoia* County, is providing a subsidised branded fertiliser blend produced specifically for the

county by a company called *Mavuno* Fertilizers. Other Counties implementing soil specific fertilizer blends include Kakamega, Bungoma, Uasin Gishu, and Vihiga. Industry players were encouraged to partner with Counties and set up demonstration on best practices and new technologies in model farms at the ward level.

Pursuant to the fourth schedule of the Constitution of Kenya 2010, inputs and subsidy provision is a fully devolved function. Meaning county governments can procure and distribute fertilizer to farmers. Counties are now lobbying through the Senate that the monies that are meant for the fertilizer subsidy, should go directly to the counties. The current county subsidy program distributes fertilizer through stockists at the ward level unlike the National subsidy program that uses the National Cereals and Produce Board depots that are scattered within various Counties. The National Cereals and Produce Board, the sole distributor of government subsidized fertilizer still operates using the National Cereals and Produce Board Act – CAP 338 which was developed before the advent of devolution and is therefore inconsistent with the constitutional provision for a devolved function.

Hon. Nzomo made the following recommendations (i) the national government should transfer the fertilizer fund to counties as conditional grant to enable counties distribute fertilizer; since inputs provision function is a devolved role. (ii) increase fertilizer subsidy budgetary allocation and subsidized fertilizer across board to level the ground for all industry players. (iii) The County Governments can leverage on the Regional Economic blocks to enjoy the economies of scale as opposed to central procurement by National Government (iv) KALRO should undertake National Soil mapping & analysis to determine the soil nutrient requirements to inform decision making when it comes to fertilizer importation. This will ensure that, soil, region and crop specific fertilizers are procured. (vi) Counties can identify &manage depots for storage and distribution of fertilizer and use existing storage structures since construction of storage facilities was transferred to County Governments.

Questions and Answers from the Floor

Question 1: Is there any sustainable farming without crop rotation?

Question 2: How are bio-fertilizers and organic fertilizers regulated as they are not captured in the existing law?

Question 3: Are there any systems in place to monitor distribution and utilization of subsidy fertilizers?

In response, the following discussion was made; Conservation agriculture is basically about three principles, that is permanent soil cover, crop rotation and of course minimal soil disturbance. The biggest challenge in crop rotation is the rotational crops. Attempts have been made to rotate maize with soya but there is a seed shortage. Canola is a viable option to be included in a rotational programme once the issue of seed availability is addressed. The Government is in the process of operationalizing the Fertilizer and animal foodstuffs Board that will address all issues related to fertilizer. Regarding monitoring the subsidy fertilizer usage, farmers participating in the project are vetted at ward level by the ward agricultural officers and there is a record of all the farmers who have taken the fertilizer. There is a need to provide a platform to consolidate and share such information about soil health and related information

5.3.3 Fertilizer Subsidy Programs: Constraints, Opportunities and Lessons

The presentation on 'Fertilizer Subsidy Programs: Constraints, Opportunities and Lessons' was made by Dr. Timothy Njagi from Tegemeo Institute of Egerton University

An overview of the constraints, opportunities and lessons was given based on data collected from panel surveys done by Tegemeo from 1994 -2010. The panel survey ended in 2010 that consisted of 1,500 farmers, and in 2014 an expanded panel with 7,000 farmers was started. Results show that in reference to maize farmers and regard to inorganic fertilizers, there is a significant difference of up to 50% in yield between farmers who use fertilizer and the ones who do not apply.

They are two subsidy programs: the National government National Accelerated Agricultural Inputs Access Program (NAAIAP) which was introduced from 2007 – 2016; and the counties subsidy programs. From the data, it is evident that there is no uniformity in the programs that are being implemented by the county governments. In addition, counties do not follow the National Subsidy Fertilizer though in some there are some complementarities.

Focusing on NAAIAP the program has two components; (i) *Kilimo Plus* – farmers get a grant of 10kg of seed and 100kg of fertilizer both for basal and top dressing. The focus is on improving household food security through increasing productivity. The farmers are then expected to graduate to *Kilimo Biashara* where farmers are expected to use fertilizer and

improved seed and in addition purchase insurance. Moreover, the program would establish cereal banks and then link these farmers to markets. It is expected that if the farmers access better markets, they would be able to reinvest again in agriculture, thus raising their productivity and ultimately their income and therefore attaining food security.

The other subsidy program at the National level has been in operation since 2008 and is distributed through the NCPB. The program spends an average of about Kshs. 3 million annually and to date expenditure is Kshs. 30.1 million since inception. The program up until 2015 mainly imported and distributed DAP, CAN fertilizers however, since 2017, blended fertiliser is now provided as part of the subsidy and constitutes 13% of total quantity purchased.

An analysis of the distribution shows that the general subsidized program is heavily skewed towards the maize growing areas. Almost 50% goes to the North Rift and another 20% goes to the South Rift and then the rest is distributed towards the other regions. The availability of subsidized fertiliser, especially in the North Rift where majority of those fertilizer is concentrated, reduced the probability that a farmer will participate in the commercial market by 30%. And in addition to that, it ended up displacing by almost 20% of the commercial retail fertilizer.

The other constraints that are facing the subsidy programs are the distance and the cost. The average distance for most of the households and to the nearest NCPB store is an average of 25 km according to study carried 2014. In addition to the bureaucracy of acquiring the fertiliser, diversion of fertiliser, repackaging and selling often leads to adulteration, affecting the quality of fertilizer. Timeliness of the subsidy means that farmers become dependent on the subsidy, so they end up planting late affecting the cropping cycle.

Rent-seeking, political interference and elite culture are a challenge. Moving away from maize, recently the government has also launched a subsidy fertilizer for the coffee farmers. Again, there are a lot of questions surrounding that; what is really informing this intervention? We know that over time the area of coffee has seriously declined, we have a lot of people who have been exiting that sector. And even if we gave them fertilizer, would that be the intervention that would help us revamp or boost coffee production in the country? So, we again want to reinforce the need of using evidence to be able to inform these kinds of policies.

A study carried out by the institute in partnership with University of California, Davis, in Western and some parts of Central Kenya showed that soils even within the same village are heterogeneous. The soil maps should be developed at the ward level.

The presentation highlighted the following lessons: the program needs to be re-designed such that strategic objectives are integrated with learning; ensure that the subsidies are SMaRT; ensure joint government and private sector participation and at the same time provide clear exit strategies, that control endless fiscal burden. For the program to thrive consideration needs to be made to ensure that a holistic package is put in place (seed + fertilizer + insurance + extension); and finally ensure soil health management which includes ISFM practices and periodic soil testing.

Questions and Answers from the Floor

A comment was made about the adulteration of fertilizer, and how it can be supported by data. It was suggested that samples should be taken at distribution points for analysis and give an indication on the extent of adulteration.

5.3.4 Analysis of Fertilizer Policies in Kenya

The presentation on 'Analysis of fertiliser policies in Kenya' was made by Mrs. Nancy Laibuni from Kenya Institute for Public Policy Research and Analysis (KIPPRA).

An overview of the policy instruments was given, lessons learnt and suggestions. Sub-Saharan Africa still has the lowest input use compared to other regions of the world in terms of fertilizer application. The country's consumption is at an average of 30kg per hectare over the years, that's from 2002, while our neighbours are way below.

The countries or the regions that have increased their fertilizer use and have seen benefits are mainly the Americas and then the Asian countries- the green revolution.

Half of the fertiliser imported is used in maize production, and it's mainly CAN and DAP. The other commodities are: tea where NPK and MOP is used; and horticultural crops which is the third largest. Under horticultural crops floriculture is a main consumer after which comes potatoes, coffee, wheat, tobacco, rice and barley.

In regard to the policy instruments, in the 60's and the 80's there were heavily subsidized government-controlled programs that ensured all the inputs procured went through what we were calling the KFA then, current NCPB. The result was the program benefited just a few or

well-connected farmers and was expensive to run in terms of administration. It was prone to political manipulation and provided limited options for farmers because there were no have crop, soil or nutrient specific fertilisers. The Structural adjustment programs in the 1980s and 1990s saw the privatization of most of the parastatals and of course the KFA was not left behind. And here we had a lot of disruption of the markets in terms of input use, there was a decline in fertiliser use. The market was liberalized in 1993 hence the private sector completely controlled the market and the government reduced the donor fertilizer imports to 5%. After that the Abuja Declaration of 2006 saw countries in the African Union committing to increase the fertilizer usage as individual countries. The other significant event that necessitated policy intervention were the global high prices in 2008. After this development the government reintroduced the subsidy program as outlined in the Kenya Vision 2030. The program that had three tiers; the bulk procurement, local manufacturing, and the local blending of fertilizers.

The implication of the policy instrument over the years anecdotal evidence indicate that with or without the subsidy, during and after the structural adjustment programs, the productivity of food crops has continued to decline implying that there are other underlying issues that need to complement the subsidy program for the impact to be evident. The issues include; farmers have limited knowledge about input use and are risk averse, leakages and diversion of subsidized inputs away from their intended use is substantial, Timing of the delivery to farmers, availability of complementary resources (e.g., seed and fertilizer together, market access), and technical skills in input use is key. There is need for concerted and coordinated efforts of public and private sectors actors for the programs to be effective e.g. the private sector – importation and distribution to the farm level. Public sector quality control of fertilizer, research -on soil fertility and fertilizer use. Both sector actors carry out dissemination.

The following suggestions were given: (i)Targeting and rationing of input subsidies targeted at farmers who otherwise would not use inputs, (ii) Reduce transaction costs in the fertilizer supply chain so as to increase access at affordable prices (iii) Complementary and integrated investments such as transport, storage, communication systems and output markets (iv) Operate at Economics of scale to lower staple produce prices and/or raise the productivity of factors of production (v) Research is needed on ways to increase the crop

response to fertilizer (Soil acidity, Organic matter, Management practices, Micro-nutrient deficiencies etc.)

Questions and Answers from the Floor

A comment was realised that pointed out that policies on tax regimes affecting fertilizers were missing in the presentation. In regard, to tax N P K are exempted from tax and nothing has been mentioned on micronutrients and more specifically calcium. In addition, participants wanted to know the progress towards realization of Maputo and Malabo declaration in relation to budgetary allocation that goes to agriculture?

The discussion that followed noted that efforts should be made to consolidate the county governments expenditure on agriculture. Counties have an obligation to align themselves with the regional agreements.

Summary

The chair of the session Dr. Milton Ayieko provided the following summary of issues; (i) The need to establish an enabling environment for fertilizer policies and programs, (ii) There is an Act of parliament that deals with fertilizer and animal feeds but the board is yet to be established, (iii) There is information on fertilizer policies and programs in several documents, e.g., Kenya Vision 2030 & Big four agenda hence a need to develop a comprehensive fertiliser policy, (iv) Blended fertilizers need to be included in regulations and laws, (v) The role of private sector needs to be tapped in distribution of fertilizers, (vi) No clear evidence if fertilizer subsidies have achieved objectives, there is need for long term evaluation (vii) Ensure fertilizer subsidies are well targeted and need to reduce transaction costs and (viii) Need to develop an exit strategy for the fertilizer subsidy program

5.4 Financing Opportunities

Finance is a critical enabler in facilitating farmers' access to farm inputs for improved agricultural productivity. Currently, farming is considered highly risky by the formal banking sector and even microfinance institutions tend to increase the cost of credit, reaching only a small proportion of smallholder farmers, and provide only short-term credit. A credit system that is supportive and responsive to capital requirements by the smallholder farmers would go a long way in addressing the challenge of limited capital and access to affordable credit thereby facilitating access and use of quality fertilizers.

The objective of this thematic area was to describe and discuss prevailing financing models that are available to agro dealers and farmers to facilitate access to fertilizer for increased productivity in order to get some good insight on various roles that are being played by collaborators and stakeholders. One Acre Fund, AFAP and Equity bank shared their financing models and experiences in supporting the various fertilizer value chain actors for improved access and use of quality fertilizers.

5.4.1 One Acre Fund

One Acre Fund is an agricultural social enterprise serving over 600,000 farmers in East and Southern Africa. They support farmers with a market bundle of agricultural inputs provided on credit. Farmers choose appropriate inputs from the bundle of products and pay a down payment to ensure their products are delivered with the balance of the loan paid at the end of the season. The organization supports farmers to access fertilizer and other farm inputs through: provision of quality inputs on credit, distribution of inputs to within walking distances from their homes, training on good crop husbandry and offering postharvest support.

By 2018, the loan portfolio was about Kshs. 3.7 Billion with approximately 87,400 hectares planted. The organization has a flexible repayment plan that is based on the farmers' varying income streams but within the agreed credit period which in Kenya is an average of nine months. To minimize credit risk from their clients, the organization ensures that credit guarantee is through peers or "Joint group liability." If a farmer in that group defaults in payment of his/her loan, no one in the group will be allowed to sign for a new loan in the subsequent season. The organization undertakes sampling and testing of fertilizer to ensure that what is being supplied to the farmers complies to set standards of quality. In order to mitigate against crop loss due to climate change, the organization works with the Kenya Agricultural Insurance Program to provide insurance for farmers' crops.

From the organizational experience, the key drivers to increasing access to fertilizer lie in provision of high-quality inputs, ensuring affordability and access to credit, training on the correct farming practice and encouraging use of complimentary products like lime. The government subsidy programme should also be enhanced through inclusion of soil improvement products that can easily be adopted by the farmers.

5.4.2 Supply Chain Finance and the Role of Hub Agro-Dealers: AFAP Model

AFAP is a non-profit organization that supports small and medium-size enterprises in accessing agriculture inputs and mainly fertilizer. This is achieved through capacity building of hub agro-dealers and facilitating access to technical services during establishment of fertilizer blending plants. Hub agro-dealers undertaking wholesaling of fertilizer are involved in buying in bulk, breaking bulk and selling to the rural agro-dealers. They play a key role in advancing credit to rural agro-dealers in their network based on business relationships that have been built over time and therefore not requiring a collateral.

The NGO also facilitates business training for hub agro-dealers as well as working through the various establishments towards creating an enabling environment. This is either through formulation or review of policies that may affect the efficiency or effectiveness in performance of hub agro-dealers. It also conducts an annual agribusiness platform for agribusinesses involved in fertilizer between July, August or September to improve business linkages and sharing of information on the latest developments in the fertilizer subsector.

The NGO facilitates financial services for hub agro-dealers through a program that mainly runs supplier credit guarantee facilitation. Hub agro-dealer occupy a very strategic spot linking with large players, the importers, the manufacturers and also linking downstream to the rural agro-dealers who are placed next to the farmers. Hub agro dealers play a key role in facilitating the flow of inputs through the value chain, while at the same time they can facilitate output marketing from small holder farmers to buyers who may be looking for organized and aggregated production. They also play a role an important role in advising farmers on appropriate fertilizers and their application. In the region, AFAP has supported a large number of hub agro-dealers in the region to establish warehouses that are appropriate for fertilizer storage and also general storage.

In order to address limitation of working capital by hub agro dealers, AFAP has developed a three phase's model for facilitating supply credit guarantee. The first phase is the incubation credit guarantee phase that involves supplier and hub agro-dealer relationship building. The supplier builds confidence on the hub agro-dealer, and eventually can advance trade credit without the presence of a third party. The second phase is AFAP undertakes hub strengthening to minimize the risks through bringing a bank that will provide financial support while AFAP provides credit guarantee. The third phase is a mature commercial stage or credit where the credit is accessed directly from the bank. By guaranteeing or underwriting

a certain percentage of the risk to the supplier by AFAP, the supplier can avail goods on trade credit to the hub agro-dealer as they build their relationship. This in turn ensures that the hub agro dealers are able to supply fertilizer to their network of rural agro dealers under favourable terms for proper integration of the fertilizer value chain.

The model has however not been tried in Kenya but based on a study undertaken in Tanzania, Mozambique and Nigeria; it has been established that through hub agro-dealers, quantities of fertilizer or inputs sold increased by between 25 and 40% and revenue increased proportionately. The number of cycles that a rural hub agro-dealer will be able to sell his product increases by more than three times by using or selling through hub agro-dealers based on the established relationship and that they can get the inputs on time especially when in season and increase their business.

5.4.3 Financing Options and Climate Insurance: Equity Bank

Equity bank is a social-economic enterprise that undertakes business and some development work through Equity Foundation. Interventions in agriculture are guided by the Sustainable Development Goals (SDGs), Malabo Declaration, Vision 2030 and the strategic plan of the Company. The group is cognizant to the fact that the country is focusing on the big four where agriculture is to contribute to achievement of 10% Food and Nutrition Security. The bank is keen on committing resources towards investments that enhance resolution of the challenges/gaps for achievement of the targeted goals.

The bank's approach to agriculture is guided by four pillars with the major one being value chain financing. This involves financing the needs of the whole value chain as opposed to financing only seeds and fertilizers. The approach involves identifying the gaps in each of the stages of the value chain. This makes it easier to develop solutions that meet the needs of each stage. The bank works through strategic partnerships. The bank has invested heavily in technology so that they can efficiently serve the clients. The bank has also invested in capacity building of their staff so that they can easily understand the needs of farmers.

The bank has various financing models that include working through partnerships with other players. The financing arrangements include: risk sharing or credit guarantee; matching funds facilities, financing of contracts and warehouse receipt financing.

Through strategic partnerships, the bank was able to participate in implementation of *Kilimo Biashara* or farming as a business programme in the year 2008. In addition to financing

acquisition of seeds and fertilizers, the bank financed farmers that had just acquired some irrigation infrastructure and therefore they were able to produce a good crop and more yields. Through this partnership, the bank has been able to reach over 78,000 households with a loan portfolio of over Kshs.7 billion. The programme was renewed in 2017 and the target is to reach 100,000 farmers and a disbursement of Kshs. 3 billion in the next three to five years. The mode of delivery is acquisition of inputs by farmers for various crops under agro-dealer facilitation. The bank is also working with International Food Policy Research Institute (IFPRI) in developing a risk contingent credit making it an important part of the finance bundle. This ensures that as farmers take credit, they're also taking insurance to guard against losses of enterprises.

Currently the bank through the Foundation is implementing a Financial Access program; to contribute towards alleviation of the persistent challenge of access to finance. This three year program, targets 60,000 farmers and 5,000 SMEs that are involved in buying and supplying of inputs. The bank appeals for concerted efforts towards recruitment of beneficiaries for this program and more partners to contribute resources for enhanced reach.

Plenary Discussions

From the discussions, the participants requested that the AFAP model is implemented in Kenya to facilitate hub agro dealers to effectively serve the rural agro dealers. This will ensure that farmers' needs are adequately met and access to quality inputs is enhanced. AFAP promised that soon, they will embark on a programme of mapping out the country with a view to identifying areas where the programme can be undertaken to meet the desired objectives in line with the policies of partners. The conference also recommended that more partners are needed to contribute to Equity Bank financial access programme and called upon eligible beneficiaries to access the resources in the programme to facilitate access to quality inputs by farmers. Appropriate insurance models need to be developed to guard against business and crop loses. This is in view of climate change and other risks associated with the operating environment. More resources need to be allocated to training of value chain players to enhance their capacity of service delivery and utilization of inputs. In addition, constraints associated with produce marketing should be addressed to improve efficiency for increased incomes for the farmers and enhance business opportunities for fertilizer value chain actors.

5.5 Experiences Learned from Other Input Sectors

5.5.1 Seed Trade Association of Kenya (STAK)

The Seed Trade Association of Kenya was founded in 1992, to represent the interests of the formal seed trade. Seed is one of the pillars of the big four agenda. The current national certified seed production is estimated at 40,000 metric tons. Similar to the fertilizer subsector, the seed subsector is also facing challenges that include; Insufficient certified seed material; Low adoption of improved seed and complementary technologies; it is estimated that apart from maize and vegetables, the informal seed sector accounts for about 80% of the seed industry; Inconsistent legal and regulatory framework –need to review seed policy (Gazettement of two seed regulations in 2017); Inadequate seed varieties for marginal areas; Prevalence of adulterated seed in the market; High cost of seed (some related to CESS); Insufficient technical skills and infrastructure for new technologies; Low funding for seed research; Inability for farmers to access fertilizers in a timely manner; Climate change; Disease incidences like Maize Lethal Narcosis (MLN) and Fall Army Worms; Administrative challenges and bottlenecks with regard to Royalty payments and ordering of Early Generation Seeds (EGS) (especially maize); Lack of clear policies on Government subsidy programmes; Tax on seed consequently making seed expensive to farmers.

In order to deal with some of those challenges, the subsector has come up with the following innovations: Development of Climate Smart and resilient crop varieties (CIMMYT, AATF, ICRISAT etc.) with seed companies promoting these varieties; Information sharing platforms such as Seed Sector Platform and *Mbegu* Choice www.stak.or.ke; Kenya is among the Four COMESA countries that have harmonized their seed regulations; There has been widening of space through Self Regulation i.e. Training of Seed Analysts and Inspectors (26 Inspectors and 3 Analysts); Seed companies working together with those in the fertilizer sector to ensure timely and appropriate fit fertilizer distribution; Awareness creation on fertilizer use through field demos and Use of Labels as one of the ways to manage fake seed.

5.5.2 The Agro-Chemical-An Example of Self-Regulation

The Agrochemical Association of Kenya has been in existence since 1958 as AAK. It is an umbrella organization representing the manufacturers, formulators, distributors, importers and users of pesticides of pest control products here in Kenya. The Association falls under CropLife International and subscribe to FAO code of conduct and the International Code of Conduct on Pesticide Management. Internally, they operate under CAP 346 that regulates the pesticide industry in Kenya. These form the basis through which self-regulation is undertaken

for the pesticide industry. Currently the Association has 88 members; and any member who joins the association signs and agrees to abide by FAO code of conduct. To enhance self-regulation, AAK developed a logo that is a mark of quality. The Association ensures that any of their members identifies with the logo as a measure of self-regulation and a commitment to offering of quality products.

AAK mandate is executed under the following four pillars that are clearly articulated in its strategic plan; product stewardship, partnership building, regulatory policy and standards and institutional development. On Regulatory policy and standards, the association aims at creating a favourable environment for its members to do business. They support the government, to come up with laws and policies for industry regulation while ensuring that the business environment remains conducive.

To ensure sustainability in undertaking the mandate of stewardship and self-regulation, the industry in collaboration with the government came up with the pesticide levy, where all importers of pesticide pay 0.8% of the FOB value of that product. 0.4% is allocated to the regulator (PCPB) and 0.4 goes to AAK.

Though AAK is making progress in execution of its mandate, it is encountering similar challenges of counterfeits and adulterated products within the industry. The incidences could be practically eliminated if the fertilizer, seed and pesticide industry work together as no production can occur without these three complimentary products.

6 WAY FORWARD

6.1 Public-Private Dialogue Platforms

One of the key frontiers of development today is collaboration between the public and private sectors. The traditional approach of the development community has been to support and finance governments since governments play a significant role in setting the tone for and pace of economic development as well as providing key public services to the country. Concurrently, development policy has also gone through periods where markets and the private sector were panaceas, particularly in the 1980s with the so-called Washington Consensus, the rationale being that the private sector plays a dominant role in providing investments and jobs in many developing countries. However, unrestrained reliance on the

private sector also turned out not to be the "magic bullet" as it sometimes leads to predatory behavior as manifested in negative impacts on the environment, labor standards and corruption. Consequently, the development community has come to have a more balanced and nuanced view of the complementary roles of the public and private sectors. It has come to view the public (the state) and private (the market) sectors as complementary not contradictory, recognizing that both are needed to effect the desired development outcomes. One notable consequence is that donors and their recipient governments are increasingly showing enthusiasm for dialog between the public and private sectors and interest in public-private dialog (PPD) has begun to grow. (Pinaud, 2007)

The growing influence of civil society stakeholders (consumers, private entrepreneurs, employees, citizens, community groups, etc.) in industrialized as well as developing countries has supported this trend. In this context, calls for consultation in drafting government policies have become more prevalent. It is now generally accepted that the participation of civil society in designing public policy is critical if the government is to improve the transparency, quality and effectiveness of their policies, thereby consolidating their legitimacy. In this context, public-private dialog (PPD), that is, consultation between firms and government, is increasingly advocated as a way of improving government policies in developing countries hence creating a conducive business environment. By listening and negotiating compromises governments can learn about the local private sector's problems and adjust their policies to ensure the sector's growth and development. Similarly, private firms and the business community who are the backbone of the creation of wealth for the nation, obviously have an interest in being involved in economic policymaking. By engaging in dialogue with the government firms have an opportunity to become involved in the design and implementation of policies relating to economic strategy thus fostering a good business climate to help their operations.

6.2 Experience of Fertilizer Platform in Other Countries

In introducing the topic, the Agriculture Secretary of MoALF&I pointed out the same conversation around: inputs, accessibility, taxation, extension and information; awareness in the agriculture value chains; and financing is ongoing in many, many different. Hence the importance of this discussion as there is a need to tie all these different voices that are talking about the agriculture sector, inputs, supply, accessibility, taxation and financing along the value chains.

The Genesis of the Mozambique platform started by various stakeholders working with the Ministry of Agriculture to develop the National Fertilizer Strategy and Regulations in 2012-2015, to meet the challenge of the government five-year program and to serve as a contribution for the commitments that the country is signatory. The process was through consultation with the major fertilizer stakeholders with the main objective of establishing a framework that would increase and improve the quality of fertilizers.

The national program is one of the best documents that identifies the main constraints and the policy options for regional procurement, cost reduction of fertilizers and provides the basis for availability, accessibility and tries to find a way that could result in an organized fertilizer market in Mozambique. This formed the basis for designing the national program which was based on most of the recommendations from Abuja declaration. The team comprised the ministry of agriculture, partner institutions like AGRA, IFDC, research, AFAP, private sector, NGOs and other development partners right from the beginning.

In Mozambique for many years fertilizer use was not considered as an important input for agriculture and its only in 2012 this input was recognized as a critical constraint for agricultural productivity. Hence, under this situation the distribution network was very scarce and the skills very weak which meant that there was no market integration resulting in no incentive for fertilizer use in the country. The platform was initially led by a group of interested people, people who were committed, people, a Commission with the Ministry of Agriculture representatives and two other ministries, AFAP, IFDC, USAID, AGRA, among others. The Commission was responsible for organizing the first meeting, called General Assembly. The general assembly was open to all interested in fertilizer value chain; public sector, private sector, corporation partners, farmer's association, financial institutions, and academic institutions. Day to day activities are run by the Coordination Committee and its Secretariat. The general has elected officials, the President, Vice President, and proposes and elects the members of Coordination Committee. The Secretariat is responsible for execution, organizing meetings, implementation of activities and maintaining internal, and external communications. The Platform has changed to AMOFERT Association.

That's why they came from platform to Mozambican Association for Fertilizers (*AMOFERT), while the vision and objectives of the platform remains. The Association has a legal status as an institution within Mozambique.* Some of the issues the AMOFERT is set to address; Fertilizers registration which can take about four months, improving the capacity of the

Ministry of Agriculture for fertilizers registration, quality of testing, reduction of cost of fertilizers. On funding and the sustainability of AMOFERT it came out that for now it is heavily financed by the public sector through the ministry of Agriculture who also provide office space for the Secretariat.

6.3 Proposed Kenyan Fertilizer Platform

The proposed **Kenya Fertilizer Platform should** be a forum for both public and private dialogue, but this was open for discussion in the conference. Kenya is one of the largest fertilizer markets in the Sub-Saharan Africa region with a very vibrant private sector, strong institutions, strong research; but Examples of some comments arising from key stakeholders are; there is chaos in the fertilizer market place, how effective is the current fertilizer subsidy? There is need to address acidity, there is need to bring sanity to soil testing laboratories, what are the right fertilizers to use, among a lot of other issues. It also came out that Round table meetings have been previously been held since the 1990's but the issue is what is the different this time and how will it be made to work for the benefit of the sector and towards increased agricultural productivity. A key driver is the current Kenya Government the Big 4 Agenda.

A paper by AFAP on Public Private Dialogue (PPD) came up with a conclusion that, there is consensus that PPD can be very effective if they're constituted properly. And one of the best definitions of those was by Anderson who wrote that, "It's the act of public and private stakeholders coming together to define and analyze problems, discussing and agreeing on specific reforms and then working to ensure that these ideas become a reality". In the Kenyan context, over the last few days and the last few weeks, and through the Coordinating Committee it is coming out that, there's a need for a mechanism that is independent and representative of the fertilizer sector. It should discuss issues of mutual concern and collectively propose solutions. It should be a mechanism that has the ears of key decision makers, even the President if needed.

In forming the platform, the questions to be answered are; what is the mission of the platform? What were our goals? How do we achieve these goals? What is a structure? How does it operate, and what is the governance structure? Definition of a fertilizer platform is a public-private mechanism composed of key fertilizer sectors across the whole fertilizer space, production, access, quality and use, to identify and resolve policy issues and constraints facing the sector on an ongoing basis. KeFERT as a platform seeks to facilitate action on key

issues in the fertilizer sector identified through multi stakeholder dialogue and coordination on an ongoing basis. So, what are the goals that need to be addressed? The key issue is how such platform is to ensure impact because at the end of the day results are needed. One of the key methods of ensuring this is by building a platform that is sustainable, if the needs are there the platform will have some impact.

In the plenary, among the issues emphasized was the inclusion of the principles and philosophy of the Constitution of Kenya in the platform. Also, regarding governance, the platform should have a chair and a vice chair; co-chairing was not encouraged. The threat of having strong players whose often have their word become law was also raised.

The guiding questions to the break-out sessions were: from your perspective, what are the top five issues in the fertilizer sector that need to be addressed? If more than five, the groups could list all. What is the groups concept of the platform? Do you think that having a fertilizer platform is a good idea? How should it be set up? Who are its members and how should it operate?

7 RECOMMENDATIONS

For the platform to be credible, effective and for people to feel that they want to be a part of it, it must have checks and balances to avoid hijacking by some key players such as: the national government, county government, and Fertilizer Association of Kenya (FAK). It should also have the interest of all stakeholders and address all crosscutting issues for the benefit of the whole industry and benefit of the country. This way the fertilizer industry can be transformed and create a lasting impact within the country not only in fertilizer but the whole agricultural inputs sector. The key main areas, as identified in the conference, to be addressed by the platform are:

1. Policy and Regulation.
2. Issues of affordability and efficiency (e.g. demurrage issues at the port).
3. Information dissemination and training.
4. Review of the subsidy program.
5. Soil testing.

Other areas which need to be addressed in terms of ranking are: first, issues of quality and liming, second, infrastructure and lastly, taxation. This underscores the importance of

deciding on the structure of the platform with a clear way forward on short-term, mid-term and long-term plans on issues to address.

There is need to go back and look at some of the proclamations that came out of the *Abuja Declaration*. For instance, the African Green Revolution cannot be possible without increased usage of fertilizer to increase productivity. Also noted was that NPK is common in Africa but rarely meets complete nutrient requirements and this is a pointer to increased levels of research into exactly what is needed to really address productivity. It was noted that there might be the right mix of policy and regulations required to achieve Food and Nutrition Security goals. This is a very important point because it is evident that despite the many policies, strategies, and regulations that are there, we may not actually be very strong on implementation. The issue of availability and affordability of fertilizers to farmers and the whole area of taxation was quite well addressed. It came out that taxation can hinder the availability and affordability of fertilizers to farmers.

7.1 Fertilizer, Soils and Crop Nutrition under the Changing Climatic Conditions

The Government should give priority in delivering balanced fertilizers to small holder farmers. There is need to address accessibility of soil testing and completion of soil mapping as this would lead to soil and crop specific blends of fertilizer to be made available. However, soil testing methods need to be harmonized across the available facilities within the country. Soil acidity as a major challenge needs to be addressed with soil amendments either using lime or non-acidifying fertilizers. Commercialization of lime, non-acidifying fertilizers, together with demonstrations and extension should be expanded There is need for exchange of agronomic and soils information by research institutions. Also, it was observed that there is need for harmonization of the tax exempt code for all agricultural inputs (including lime).

7.2 Fertilizers Supply Chain and Usage

There is need to harmonize government subsidized fertilizer and private sector imported fertilizers to avoid price distortion in the market, negatively affecting productivity. The issue of delayed clearance at ports need to be addressed. The non-recognition of Certificate of Conformity (COC) needs to be addressed as it causes delayed clearance at the port, through the strengthening of the Pre-Verification of Conformity (PVOC) at point of loading ports in order to avoid re-testing at the port of destination. The delayed clearance leads to added costs of the product leading to increased last mile cost to the farmer and more so affecting timely

availability. The national systems of fertilizer quality control should be strengthened, and the need for establishment of well-equipped permanent inspection teams. This needs to be supported through enhanced analytical capability of the labs, training of fertilizer handlers and improvement in storage in the fertilizer supply chain to maintain fertilizer quality. The capacity of agro-dealers in product information, handling and storage and extension support should be expanded, and where possible through the existing agro-dealers associations, which need to be strengthened. Accessibility should be improved through infrastructure development and also through appropriate fertilizer packages (small sizes) especially for smallholders.

7.3 Policy, Laws and Regulations

Here, it was noted that there is need to establish a competitive, enabling environment for fertilizer policies and programs. The proposed fertilizer board needs to be constituted with input from key public and private stakeholders, so that it leads to appropriate regulation, and balanced public and private sector needs. The role of the national government and country governments needs to be harmonized for effective delivery of fertilizers to the farmer especially the two levels of subsidy. There is also a need to restructure the subsidy program into a SMaRT subsidy program that does not bypass the private sector. The subsidy program should support a holistic package of support interventions with clear exit strategies.

7.4 Financing Opportunities and Experiences Learned from Other Input Sectors

Two issues came out strongly in this session, namely; farmer financing of input packages (fertilizers, seeds and chemicals) should be expended coupled with crop insurance and financing for hub and retail agro-dealers and other actors in the value chain.

7.5 Proposed Fertilizer Platform

The idea of the Kenya Fertilizer Platform has been broadly supported by the stakeholders to address challenges raised by stakeholders during the deliberations over the last two days. It is hoped that any legal issues, legal hurdles that are foreseen will be considered in discussing the constitution of this platform, as came out in Mozambique's experience that they had to transform from a platform to an association because of the legal recognition. A platform looked loose while the association could be recognized legally. So, any factors that would constrain the flexibility of the operations need to be considered in constituting this platform.

The following is the summary of the five-group break -out session representing, the farmers, County Governments, Ministry of Agriculture, Livestock, Fisheries and Marketing with other Government Agencies, Private Sector and Research. On the five top issues which need to be addressed in the fertilizer sector, were in order of priority: 1) high fertilizer prices; 2) need to harmonize government subsidy fertilizer and the private sector commercial fertilizers; 3) improve subsidy fertilizer accessibility; 4) need for crop and area specific fertilizer formulations; and 5) soil testing for reliable recommendations. All the 5 groups agreed on the need of formation of the fertilizer platform which should include all stakeholders in the set-up. Operations of the fertilizer platform needs to have a secretariat for daily management with a steering committee. Funding should be through fund mobilization, development partners, private sector and the government.

8 CONCLUSION

On soil fertility and from research, it is always assumed in this country that we had enough K in our soils so what is need is the N and P fertilizers. Hence, the need for soil testing analysis together with soil mapping to contribute towards SMaRT soil fertility approaches where crop and area specific fertilizers are recommended. Other areas of concern were on liming. The constraints of the fertilizer industry were also highlighted.

The culmination of the two days discussions concluded that the formation of The Kenya Fertilizer Platform is necessary in order to address the challenges of the fertilizer industry. Once all the ideas are put together and addressed, Kenya may realize an increase in fertilizer usage to over one million metric tons within the next four, five years. This would mean an increase from the current about 28.6 kilos per hectare achieved since the Abuja Declaration when it was at 20kgs per hectare, towards attaining the 50kg per hectare as declared during the Abuja Declaration in Nigeria. This would go a long way towards improved productivity leading to improved livelihoods.

9 ANNEXES

9.1 Program

Kenya Fertilizer Roundtable (KeFERT)

Moderator: Mr. Kinyua Mbijjewe

TIME	ACTIVITY	FACILITATOR
	Day 1	
Opening Session	**Official Opening Ceremony** **Chair: Agriculture Secretary**	
07.30-08.00 hrs.	Registration	Conference Secretariat
08.00-08.20 hrs.	Guests are Seated	
08.20-09.00 hrs.	Welcome and Introductions	Agriculture Secretary
09.00-9.30 hrs.	Arrival of Guest of Honor & Tour of Exhibition	Cabinet Secretary Ministry Agriculture, Fisheries, Livestock and Irrigation (MoALF&I)
9:30-10:30	National Anthem and East African Anthem	
	Opening Remarks	MoALF&I
	Keynote Address: Taking Stock From The Abuja Declaration	IFDC President – Dr. J. Scott Angle
	Remarks by the Permanent Secretary	Permanent Secretary, MoALF&I
	Remarks by Cabinet Secretary & Welcome of the Guest of Honor	Cabinet Secretary, MoALF&I
	Official Opening Statement	Guest of Honor
	Photo Session	
10.30-11.00 hrs.	*Tea Break*	
Thematic Area 1	**Fertilizers, Soils and Crop Nutrition under Changing Climatic Conditions** **Chair: Shamie Zingore, IPNI**	
11.00–11.20 hrs.	**Keynote Presentation**: The potential of soil- and crop-specific fertilizers – the Soil SMaRT Approach	Dr. John Wendt, IFDC

TIME	ACTIVITY	FACILITATOR
11.20-11.40 hrs.	Overview of soil fertility & available soil testing programs to develop fertilizer recommendations in Kenya	Dr. Catherine Kibunja, KALRO
11.40-12.00 hrs.	Overcoming Soil Acidity and Constraints through Liming and Soil Amendments	Dr. Anthony Esilaba, KALRO
12.00-12.20 hrs.	Innovations in Commercialization and Adoption of Liming Technology	Michael Kamau, Kenya Markets Trust
12.20-12.40 hrs.	Plenary Discussions & Proposed Actions	Chair – Thematic Area
Thematic Area 2	**Fertilizer Supply Chain & Usage** **Chair: Rebbie Harawa, AGRA**	
12.40-13.00 hrs.	**Keynote Presentation**: Constraints and Opportunities in the Kenyan Fertilizer Industry	Eustace Muriuki, Fertilizer Association of Kenya
13.00-13.20 hrs.	Kenya Fertilizer Quality Assessment	Joaquin Sanabria, IFDC
13.20-14.20 hrs.	*Lunch Break*	
14.20-14.40 hrs.	Fertilizer Cost Build up	Grace Chilande, IFDC
14.40-15.55 hrs.	Fertilizers and the role of Agro-Dealers	James Mutonyi, AGMARK
14.55-15.10 hrs.	The Farmer Experience of Soil Fertility Challenges	Zacharia Kuto, Farmer
15.10-15.30 hrs.	Plenary Discussions & Proposed Actions	Chair – Thematic Area
Thematic Area 3	**Policy, Laws and Regulations** **Chair: Dr. Milton Ayieko, Tegemeo Institute**	
15.30-15.50 hrs.	Current Policies, Laws, Regulations and Standards governing the fertilizer sector in Kenya	Ann Onyango, MOALF&I Director KEBS
15.50-16.20 hrs.	*Tea Break*	
16.20-16.40 hrs.	Experience of the Counties in Soil Fertility Management (Programs and Regulations)	Mary Nzomo, CEC Tranzoia
16.40-17.00 hrs.	Review of the Kenya Fertilizer Subsidy Program, Constraints and Opportunities	Dr. Timothy Njagi, Tegemeo Institute
17.00-17.20 hrs.	Analysis of the Fertilizer Policies in Kenya	Nancy Laibuni, KIPPRA

TIME	ACTIVITY	FACILITATOR
17.20-17.40 hrs.	Plenary Discussions & Proposed Actions	Chair – Thematic Area
	Day 2	
Thematic Area 4	**Financing Opportunities and Experiences Learned From Other Input Sectors** **Chair: Susan Maina, Kenya Markets Trust**	
08.00-08.20 hrs.	**Keynote Presentation**: Financing and Smallholder Farmers: The One Acre Fund Experience	Agnes Ngare, OAF
08.20-08.40 hrs.	Supply Chain finance and the role of hub Agro-dealers	Joseph Mwangangi, AFAP
08.40-09.00 hrs.	Financing options and climate insurance	Esther Muiruri, Equity Bank
09.00-09.15 hrs.	Innovations in the Seed Sector – the Experience of STAK	Duncan Onduu, STAK
09.15-09.30 hrs.	The Agro-Chemical Sector – An example of self-regulation	Evelyn Luseneka, AAK
09.30-10.00 hrs.	Plenary Discussions & Proposed Actions	Chair – Thematic Area
10.00-10.30 hrs.	*Tea Break*	
Way Forward	**Proposed Fertilizer Platform** **Chair: Ann Onyango, Agriculture Secretary, MOALF&I**	
10.30-11.00 hrs.	Experience of Fertilizer Platforms in Other Countries	Carlos Zandamela, Mozambique Fertilizer Platform (AMOFERT)
11.00-11.30 hrs.	Presentation of White Paper for Proposed Kenya Fertilizer Platform	Alexander Fernando, IFDC
11:30–12:00 hrs.	Plenary Discussion on Proposed Fertilizer Platform & Agreement on Way Forward	Moderator
12:00–13:00 hrs.	Breakout Sessions to develop Action Plan for Fertilizer Platform and Nominate Platform Members	Moderator
13.00-14.00 hrs.	*Lunch Break*	
14.00-15.30 hrs.	Presentations of Breakout Sessions in Plenary	Moderator

TIME	ACTIVITY	FACILITATOR
15:30-16:00 hrs.	Summary of Proposed Actions from Plenary Thematic Discussions	Cabinet Secretary
Closing Ceremony	**Closing Ceremony** **Chair: Permanent Secretary, MoALF&I**	
16.00-16.30 hrs.	Prize Giving & Closing Remarks	Cabinet Secretary
	Vote of Thanks	Moderator
16.30-17.30 hrs.	Networking Event	KICC

9.2 Presentations

Presentations made at the Kenya Fertilizer Roundtable can be accessed at the following website:

https://ifdc.org/presentations-given-at-the-2018-kenya-fertilizer-round-table/

9.3 List of Participants

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Susan Maina (Session Chair)	Kenya Market Trust
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Anthony Esilaba	Kenya Agricultural Livestock Research Organization (KALRO)
Dr. Shamie Zingore (Session Chair)	International Plant Nutrition Institute (IPNI)
Dr. John Wendt	International Fertilizer Development Center (IFDC)
Catherine Kibunja	Kenya Agricultural Livestock Research Organization (KALRO)
Dr. Rebbie Harawa (Session Chair)	Alliance for a Green Revolution (AGRA)
Eustace Muriuki	Fertilizer Association of Kenya
Joaquin Sanabria	International Fertilizer Development Center (IFDC)
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Mary Nzomo	CEC-Trans Nzoia
Agnes Ngare	One Acre Fund
Joseph Mwangangi	The Agricultural Market Development Trust (AGMARK)
Evelyn Lusenaka	Agrochemicals Association of Kenya
Michael Kamau	Kenya Market Trust
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Zakaria Kiptanui Kuto	
Timothy Njagi	Tegemeo Institute
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Duncan Onduu	Seed Trade Association of Kenya
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Mary Nzomo	Trans Nzoia

2018 Kenya Fertilizer Roundtable (KeFERT) Speakers

Thematic Area 1: Fertilizers, Soils and Crop Nutrition under Changing Climatic Conditions

Chair

Shamie Zingore, IPNI

Dr. Shamie Zingore is research expert with over 15 years of international experience in plant nutrition research. He is the Regional Director for the sub-Saharan Africa Region at the International Plant Nutrition Institute, a position he has held since 2010. In this role, he is leading projects that promote the adoption of fertilizer best management practices. He holds a PhD degree in Soil Science and Farming Systems Analysis from Wageningen University and MSc and BSc degrees in Soil Science from the University of Zimbabwe. He has published over 40 papers scientific papers and supervised numerous MSc and PhD students.

Presenters

John Wendt

Dr. John Wendt joined IFDC in 2011 and is the Deputy Director for Field Research, based in Nairobi, Kenya. He has more than 20 years of experience across the agricultural research-to-development continuum in diverse African environments (semi-arid Sahel, East African savannas, West African rainforests) involving multiple cereal, legume and root and tuber crops. His current area of focus is on balanced crop nutrition, which is addressing all crop nutrient deficiencies and soil acidity constraints through provision of balanced fertilizers and lime. His experience includes diverse management experience of multi-disciplinary teams of scientists, technical staff, grantees and stakeholders at project, program and research station levels. John has specific expertise in soil and plant analysis laboratory management, balanced crop nutrition, conservation agriculture practices, and integrated soil fertility management.

Prior to his position at IFDC, John was Northern Area Projects Manager and head agronomist for ACDI/VOCA from 2008 to 2011 in Uganda. From 2001 to 2006, John was soil scientist and program and station administrator for the International Institute for Tropical Agriculture (IITA), also in Uganda. John was a postdoctoral fellow for the Rockefeller Foundation in Malawi from 1989 to 1993. He holds a doctorate in agronomy from Purdue University, West Lafayette, Indiana, USA. He also earned a master's degree in agronomy and a bachelor's degree in agricultural engineering from Texas A&M University, College Station, Texas, USA.

Catherine Njeri Kibunja

Dr. Catherine Njeri Kibunja is a Senior Principal Research Officer with the Kenya Agricultural and Livestock Research Organisation (KALRO), with a bias in soil fertility and plant nutrition. She holds a PhD degree in nitrogen dynamics and soil microbiology from the University of Nairobi. She began her career as an Assistant Agricultural Officer in the Research Division of the Ministry of Agriculture in December 1979. Later on, she moved to Kenya Agricultural Research Institute (KARI) which was established in 1989 where she rose to the position of Senior Principal Research Officer.

Dr Kibunja has extensive expertise in the use of nuclear techniques in agriculture and has participated in many IAEA funded projects focusing on enhancing agricultural productivity. In addition, she has evaluated the efficacy of several imported/locally manufactured bio-fertilizers before marketing in Kenya on behalf of the Kenya Standing Technical Committee on Imports and Exports (KSTCIE) of the Ministry of Agriculture. She is currently involved in validating and promoting sustainable soil fertility management strategies using lessons learnt from the Kabete 40-year old long term experiment. She has backstopped many collaborative projects, including Efficient Nutrient use in east Africa (ENSET project) supported by the Royal Netherlands; nitrogen efficient maize (IMAS project with CIMMYT) and the African Soil Information Service (AfSIS project with TSBF-CIAT) and lately the regional AGRA-funded and CABI-managed project on Optimizing Fertilizer Recommendations in Africa (OFRA) where soil-crop-region fertilizer recommendations were developed for 7 food crops and 8 agro-ecological regions foe increased on-farm profitability. Dr Kibunja has extensive expertise in the area of integrated soil fertility management having been the National Coordinator of Integrated Soil Fertility Management (ISFM) programme within the Natural Resources Management Division of former KARI, where she was engaged in guiding research scientists in developing annual work plans and budgets and executing project activities. She is currently the Head, Soil Fertility and Plant Nutrition Research Programme, one of the seven programmes implemented at KALRO-Kabete centre, where the ISO-certified KALRO Soil Laboratory is situated. She has published several papers in referred journals, book chapters and conference proceedings in the area of sustainable soil fertility management.

Anthony O. Esilaba

Dr. Anthony O. Esilaba is a Soil Scientist and the Assistant Director, Natural Resources Systems Unit at the Kenya Agricultural and Livestock Research Organization (KALRO) Secretariat in Nairobi, Kenya. His responsibilities include national coordination of research programmes that include soil and water management, integrated soil fertility management, land use planning, irrigation, drainage and management of problem soils.

Dr. Esilaba received his Bachelor's and Master's degree at the University of Nairobi in Agriculture and Soil science, respectively. He obtained his doctorate (PhD) from the University of Nebraska Lincoln, USA in Agronomy with an emphasis on soil chemistry/fertility.

He has more than 30 years' experience as a Research Scientist in Land and Water Management and Agroforestry with emphasis on Integrated Soil Fertility Management and Climate Smart Agriculture. As a national scientist he has collaborated with national, regional and international institutes in many projects.

Dr. Esilaba has supervised MSc. and PhD students at the University of Nairobi and Egerton University and he has served as an external examiner at Moi and the Nairobi University in Kenya. He has published more than 22 book chapters, edited 1 book and 1 conference proceedings, 39 papers in refereed journals, 2 training manuals, 14 technical handbooks/bulletins, 92 papers, abstracts and

posters in published conference proceedings, 4 policy briefs, edited 4 technical publications/reports, compiled and edited 8 institutional annual reports. He has also been a consultant for ICRAF, AGRA, ASARECA and the International Water Management Institute (IWMI). Recently he was the Chairman Soil Science Society of East Africa (SSSEA) from 2011 to 2013 and is a member of various professional organisations.

Michael Kamau

Michael Kamau is an Intervention Specialist in change of Yield Enhancing Technologies; Fertilizer and Agricultural Lime at Kenya Markets Trust. He has 15 years of experience in agricultural input markets, specifically in fertilizer and crop protection product development and marketing. Michael has previously worked in the public and private sector. He was a Technical and Marketing Manager- Bio-medica Laboratories Ltd, Country Manager- Kencrop Kenya Ltd. and a Divisional Agricultural and Extension Officer at the Ministry of Agriculture. Michael focuses in Agribusiness in a fast-paced environment to fully utilize his skill to ensure sustainable access to improved fertilizer, seed, and other inputs at the farmer level and to support a continuum of learning and utilization of productivity-enhancing inputs among smallholder farmers

Thematic Area 2: Fertilizer Supply Chain and Usage

Chair

Rebbie Harawa, AGRA

Rebbie Harawa is currently the Head for Soil Fertility and Fertilizer Systems at AGRA responsible for helping countries to build sustainable soil health and fertilizer systems for improved crop productivity. Before joining AGRA, Rebbie worked as a Team Leader and Science Coordinator for the UNDP/Columbia University-Millennium Villages Project, a multi-sectoral project which aimed at achieving the Millennium Development Goals (MDGs) at local community level. Rebbie also worked as an Adjunct Associate Research Scholar (part-time) for Global Health and Economic Development, Columbia University. Previously she also worked for World Agroforestry Center as a Research Specialist where she implemented projects on evaluating agroforestry technologies in Malawi.

Rebbie holds a Ph.D. in Soil Science (with minor in extension) from Cornell University, Ithaca, New York in USA.In addition, she received BSc and MSc in Agriculture from Bunda College of Agriculture, University of Malawi.

Presenters

Eustace Muriuki

Mr. Eustace Muriuki holds BSc (UON) and MSc (Univ. Wageningen) degrees. He is currently the Managing Director for MEA Ltd., one of the largest fertilizer companies in Kenya and the Chairman of Fertilizer Association of Kenya (FAK). Mr. Muriuki has a wealth of experience in soil fertility management, fertilizer blending and fertilizer trading.

Joaquin Sanabria

Dr. Joaquin Sanabria, Senior Scientist-Biometrician, is in charge of designing and analyzing experiments and surveys in the areas of crop nutrition, soil fertility, studies to mitigate agricultural impact on the environment, and assessments of fertilizer quality. He has conducted national fertilizer quality assessments in twelve countries throughout Africa and Southeast Asia. Sanabria has published as author or coauthor more than 40 peer-reviewed articles in scientific journals.

Sanabria has extensive experience using statistics in research projects associated with agricultural production and environmental studies at the Colombian Institute of Agricultural Research (ICA) as Research Statistician within the 1981-1995 period, at Texas A&M University as Research Statistician in the Blackland Research Center at Temple, Texas, USA, between 1995 and 2007; and at the International Fertilizer Development Center (IFDC) as Senior Scientist-Biometrician in Muscle Shoals, AL, USA since 2007.

Grace Chilande

Grace Chilande is a Fertilizer Market Specialist with the International Fertilizer Development Center (IFDC). She is also the Lead Project Coordinator of the AfricaFertilizer.org Initiative; an initiative that is hosted by IFDC and supported by AFAP and IFA, and has since 2009 been collecting, processing, and publishing fertilizer sector statistics for key fertilizer markets in SSA. AFO aims to contribute to the development of a sustainable and profitable agriculture sector in Africa through the provision of clear and opportune information on fertilizers, such as production, trade, consumption and market intelligence to fertilizer stakeholders. On market intelligence, AFO has supported the strategic analysis on routes to market for various international fertilizer producer and suppliers and specifically, in the development of fertilizer cost chain build-ups (port to farmer) through the key trade corridors in east and southern Africa. Ms. Chilande has a Bachelors in Economics and Finance from Kenyatta University in Nairobi, Kenya.

James Mutonyi

Mr. James Mutonyi is a Rural Development Expert and Agricultural Specialist with more than 20 years of experience working with small business and smallholder agriculture in Africa. He is currently the Managing Director of the Agricultural Market Development Trust (AGMARK) **www.agmark.org** – a regional development organization supporting smallholder farmers to access inputs and technologies for increased production and output markets. AGMARK has been a Key player in small holder agricultural sector in the region since 2004, working with Government Private sector and development partners to develop and implement innovative models for smallholder farmers and pastoralists to access improved inputs for increased Agricultural production and create markets production in the East and Southern African region. AGMARK work has impacted over 280,000 smallholder farmers with project funding of over $20 Million since its inception in 2004. Mr. Mutonyi has extensive experience in enterprise development in Africa, having traveled widely within the region consulting, training and offering technical support to government institutions, private agricultural input supply companies and local development institutions on issues relating to smallholder agricultural input access and output marketing.

Zacharia Kuto

Mr. Zakaria Kiptanui Kuto is the Kenya National Farmers' Federation (KENAFF) National Chairman representing Nandi County and a member of the KENAFF National Farmers' Council/National Executive Council. KENAFF is the umbrella organization of all farmers in Kenya representing the interests of over 2.2 million farm families as their legitimate voice. Pursuant to the Federation's objective to articulate issues affecting farmers by defending their interests, Mr. Kuto represents and lobbies for farmers to the relevant entities at the county, national and regional levels.

A retired teacher, Mr. Kuto is now a full time small scale farmer, well versed in community mobilization, networking and linkages. He is also a trainer of farmers in good agricultural practices (GAP), group dynamics, leadership and governance among others. As a farmer leader in Nandi County, he has championed communities living in Nandi in various beneficial initiatives. These include among others; assisting in identification of farmers and agro dealers during the National Accelerated Agricultural Input Access Programme (NAAIAP); enhancing the livelihoods of farmers through the Farmers' Fighting Poverty (FFP)" programme and he also played a vital role in the enhancement of farmers entrepreneurial skill through the Enhancement of Farmers' Entrepreneurship for Development (EFED) programme.

Mr. Kuto has represented farmers in various county agricultural committees including the Agricultural Sector Development Support Programme (ASDSP) and the National Agricultural and Rural Inclusive Project (NARIGP) – where he sits in the County Project Steering Committees.

Thematic Area 3: Policy, Laws and Regulations

Chair

Milton Ayieko

Dr. Miltone Ayieko is the Executive Director, Tegemeo Institute of Agricultural Policy and Development, Egerton University. He holds a doctorate degree in Agricultural, Food and Resource Economics from Michigan State University, USA, with specialization in agricultural markets, policy analysis and international development. Dr. Ayieko has been involved in agricultural policy research and advocacy, focusing on rural livelihoods, market development, technology adoption, seed systems and agricultural value chain analysis. He has held various positions including being the Regional Coordinator of the Integrated Seed Sector Development in Africa (ISSD Africa). He has also served in various ministerial task forces and committees. His current research interests include diversification of rural livelihoods, household food security and welfare, and poverty dynamics.

Presenters

Ann Onyango

Ms. Ann Onyango is currently Agriculture Secretary in the State Department for Crop Development, Ministry of Agriculture, Livestock, Fisheries and Irrigation. My duties include co-ordination of all Technical activities in 3 Directorates and 16 National Projects within the State Department. Deputizing the Principal Secretary in various meetings, Technical Committees and Boards of Parastatals (KALRO, Vision 2030 and Radiation Protection Board). Convener of the Technical Committee that is reviewing the Agricultural Sector Strategy for Transformation and Growth towards 2030. Over 35 years' experience in the Agriculture Sector. I hold BSc in Agriculture – University of Nairobi (Kenya) and MSc in Agriculture Extension and Rural Development – University of Reading (UK).

Mary Nzomo

Mrs. Mary Nzomo Agricultural Economist by Profession with a Masters of Science Degree in Entrepreneurship. Currently working for the County Government of Trans Nzoia, Kenya, as the County Executive Committee in charge of Agriculture, Livestock Fisheries & Cooperatives Development and also chair of the Agriculture CECMs caucus. My career spans over a period of 25 years with a wealth of experience in Agricultural Extension & implementation of various donor funded programmes. I've held several leadership positions during my career & received several awards for best performance as a Departmental Head. I aspire to empower the Kenyan farmer since the Country's economy is Agriculture driven with over 80% of the population depending on Agriculture for their livelihood. I look forward to meeting and networking with like-minded individuals & organizations with a passion for spurring, developing and advancing Agricultural growth and transformation for the good of the farming Community.

Timothy Njagi

Dr. Timothy Njagi is a seasoned Development Economist with a wealth of experience in the fields of development planning, public policy research, formulation and implementation, and monitoring learning and evaluation.He enjoys working with rural communities to develop suatainable solutions to social and economic challenges. His current research focus is on farm productivity,technology adoption, credit, governance, and impact evaluation.He holds a PhD in Development Economics from the National Graduate Institute for Policy Studies (GRIPS) and is currently a researcher with Tegemeo Institute of Agricultural Policy and Development. He is a member of the International Association of Agricultural Economists, African Association of Agricultural Economists, African Evaluation Association, Institute of Economic Affairs, Kenya, and Evaluation Society of Kenya.

Nancy Laibuni

Nancy Laibuni is a Policy Analyst at the Kenya Institute for Public Policy Research and Analysis (KIPPRA) in the Productive Sector Department. Her research interests are in the areas of agricultural policy, value chain analysis and public expenditure. She has several publications to her credit and has advocated on various policy issues in the agricultural sector. Before joining KIPPRA, Nancy worked with the Kenya Agricultural Research Institute (KARI) as Senior Research Officer in the Socio-Economics and Biometrics Division.

Thematic Area 4: Financing Opportunities and Experiences Learned from Other Input Sectors

Chair

Susan Maina, Kenya Markets Trust

Susan is a market systems development expert with more than 10 years of management experience working in economic and private sector development in Kenya. She is currently a Sector Manager at the Kenya Markets Trust (KMT) with key roles in sector strategy development and management of interventions aimed at improving the performance of the Agricultural Inputs market in Kenya.

Susan has been involved in the development of PSD (Private Sector Development) thinking in Kenya and has been part of the BDS (Business Development Services) donor group that has evolved towards the Market Systems Development approach (MSD/M4P). In various capacities, Susan has taken a key lead in facilitating partnerships to unlock co-investments from private sector firms, and supported establishment of new retail strategies that have increased access to quality inputs and private extension support for smallholder farmers.

Susan has strong experience in strengthening long-term relationships between market actors, as well as building capacity of lead firms and other agribusinesses, cultivating BDS providers, partnering with financial institutions to increase access to finance for under-served populations, and working with women- and youth-led MSMEs to increase competitiveness and access to local, regional, and international markets.

Presenters

Agnes Ngare

Agnes is a supply chain professional with over 10 years of experience in customer service, warehousing, distribution, demand management, logistics and ERP Project management. At One Acre Fund, Agnes ensures timely delivery of affordable, quality of fertilizer for over 600,000 smallholder farmers across One Acre Fund's seven countries of operations.

Joseph Mwangangi

Joe passionately believes that appropriate agribusiness interventions have potential to effectively counter Africa's perennial poverty and food insecurity trap. He is an Agribusiness Advisor Board Secretary to AFAP and a founder member/trustee of the Agricultural Markets Development Trust (AGMARK). He has been a key architect and promoter of the Hub-Agrodealer model for distribution of yield enhancing agricultural inputs and technologies in eastern and southern Africa for the last ten years. Joe has over thirty years' involvement in implementing agribusiness development programs for leading international development agencies including TechnoServe, CRS and CNFA. He owns and runs a private company engaged in poultry production and processing for the Nairobi market in Kenya. He has a Masters in Agricultural Development from the University of London.

Esther Muiruri

Esther Muiruri is an Associate Directorin charge of Agribusiness at Equity Bank. Esther also serves as a Director in the Board of Equity Insurance Agency a Subsidiary of Equity Group. She graduated with a degree in Business Administration and a Master Degree in Strategic Management from the University of Nairobi.

Before joining Equity Bank, Esther had worked with Government of Kenya in various positions managing agriculture projects working with farmers and other stakeholders in the wider agriculture sector in Kenya. Esther established the agribusiness department and introduced financing of agriculture value chains through strategic partnerships with players in the agriculture sector. She has served as a member of most agricultural stakeholders' forums in Kenya with objective of making smallholder agriculture commercially sustainable and internationally competitive.

Duncan Onduu

Duncan Ochieng' Onduu is a Kenyan and holds a Master of Arts Degree in Planning obtained from the University of Nairobi in 1997 on a University Scholarship. He is the Executive Officer; Seed Trade Association of Kenya (STAK). STAK was formed in December 1982 under the Societies Act Cap 108 of the laws of Kenya, to represent interests of the seed sector and to promote the development of formal seed trade. The association operated on voluntary basis until July 1999 when an independent Secretariat was set up to co-ordinate its activities in serving the interests of members. STAK is an organization of seed companies which are registered by the Kenya Plant Inspectorate Services (KEPHIS) to produce, process and/or market seed in Kenya, and includes service providers. To date, STAK has a membership of 38.

STAK's vision is **Championing a Competitive Seed Industry for Food Security.** The mission is **to enable our members grow their businesses while contributing to national and world-wide food security through information, food security and service.**

Before then, he was the Country Manager, The Donkey Sanctuary Kenya, which is an animal welfare organization. Duncan also worked with Self Help Africa (SHA) for seven years as the first Country Director for the Kenyan Programme. He took the organization through the registration process with the NGO Co-ordination Board and the setting up of the existing programmes that are an Integrated Food and Livelihood Security.

He has worked at the University of Nairobi's Department of Urban and Regional Planning as a service lecturer for five academic years; teaching Masters of Planning Students in Sociology of Planning during the academic years 1997/2001 and Master of Architecture in Community Services during the 1998/1999 Academic year and has been a Part Time Lecturer at St. Paul's University-Nairobi Campus and a Sessional Assistant Lecturer at the Technical University of Kenya at the Department of Spatial Planning and Design.

Duncan is a Corporate member of the Kenya Institute of Planners (KIP) No. 0183C coupled with an Environmental Impact Assessment (EIA)/Environmental Audit (EA) training from the Africa Nazarene University and now a Licensed Expert on EIA/EA with National Environment Management Authority (NEMA) Reg. No. 6646.

Evelyn Luseneka

Evelyn Lusenaka is the CEO of Agrochemicals Association of Kenya with over 15 years in the pesticide industry which has seen AAK to be the leading pesticide national association in Africa and Middle East. She has extensive experience in both the public and private sector Agriculture industry in Kenya and across the region with involvement in various dialogues in the sector. Evelyn is also an expert in Association Management, Pesticide Risk Management, resource mobilization and Project Management. Prior to becoming CEO, she grew the Stewardship portfolio for the industry where she led projects such as the Spray Service Provider program, Container Management and was lead in setting up the National Poison Information center at the Kenyatta National Hospital.

She has been instrumental in strengthening the industry reputation by developing partnerships with relevant stakeholders to enhance self-regulation. She has successfully developed strategic partnerships and linkages with various key government and non-governmental agencies such as World Bank, Swedish Government, Danish Government, Netherlands Government (SNV), United States Agency for International Development (USAID) and Centre for Agriculture and Biosciences International (CABI), Kenya Market Trust.

As CEO, Evelyn has transformed the Agrochem industry especially in Regulatory and Advocacy agenda, built strong linkages with various government agencies in Agriculture, environment, trade, Finance and parliament. She has been part of different policy re and formulation processes that affect Agriculture and has been involved in reviewing of various laws and regulations where she has actively participated in streamlining the regulatory agenda of the Agriculture sector.

Evelyn serves in various Agriculture committees and boards under the Ministry of Agriculture and other non-governmental agencies. In addition to this she is an expert in corporate governance.

Way Forward: Proposed Fertilizer Platform

Chair

Ann Onyango, Agriculture Secretary, MOALF&I

Ms. Ann Onyango is currently Agriculture Secretary in the State Department for Crop Development, Ministry of Agriculture, Livestock, Fisheries and Irrigation. My duties include co-ordination of all Technical activities in 3 Directorates and 16 National Projects within the State Department. Deputizing the Principal Secretary in various meetings, Technical Committees and Boards of Parastatals (KALRO, Vision 2030 and Radiation Protection Board). Convener of the Technical Committee that is reviewing the Agricultural Sector Strategy for Transformation and Growth towards 2030. Over 35 years' experience in the Agriculture Sector. I hold BSc in Agriculture – University of Nairobi (Kenya) and MSc in Agriculture Extension and Rural Development – University of Reading (UK).

Presenters

Carlos Zandamela

An Agronomist with over 30 years of experience in the industry, Carlos Zandamela, President, Mozambican Association for Fertilizers (AMOFERT), Mozambique, has over the years been a key player within the fertilizer industry in Mozambique. With numerous scholarly papers and projects under his belt, Carlos has impacted many and used his skills to support agricultural industries in Mozambique, Philippines, Italy just to mention a few

Alexander Fernando

Alexander Fernando is IFDC's Regional Director for East and Southern Africa based in Nairobi, Kenya. Fernando has 19 years of experience in agribusiness, market systems and value chain development, and management consulting. He previously served as IFDC Portfolio Manager for the region and as Country Representative and Chief of Party of the Agricultural Input Markets Strengthening (AIMS) project in Mozambique.

Prior to joining IFDC, he worked for several development organizations including TechnoServe, DAI, ACDI/VOCA, CNFA, and Chemonics. His focus has been on market systems and value chain development in staple crops, horticulture, livestock, coffee, as well as in agricultural input markets.

Fernando holds a master's degree in international affairs from Columbia University's School of International and Public Affairs (SIPA) in New York and a bachelor's degree in international relations from the University of Pennsylvania.

KeFERT Plenary Session Moderator

Mr. Kinyua M'Mbijjewe

Kinyua M'Mbijjewe is a food and agricultural consultant for Syngenta and AFAP, following 20 years leading Corporate Affairs in Africa for global agricultural companies Syngenta and Monsanto -after 4 years working in the food industry with Del Monte in Kenya.

His focus and ambition is on enabling farmers succeed commercially so that they can better feed Africa, through shaping progressive partnerships that provide predictable markets, quality farm inputs, affordable financial services, good agricultural knowledge, IT solutions and an incentivizing policy environment. In place, these elements spur a dynamic agribusiness environment that stimulates rural prosperity and economic growth.

He is particularly keen on innovative ways to support youth engagement in agribusiness, convinced that young people have the entrepreneurial energy to build successful business' in the food and agricultural space. He is based in Nairobi, is married with two children and is an active farmer.

9.5 Group Break-Out Sessions Outcome

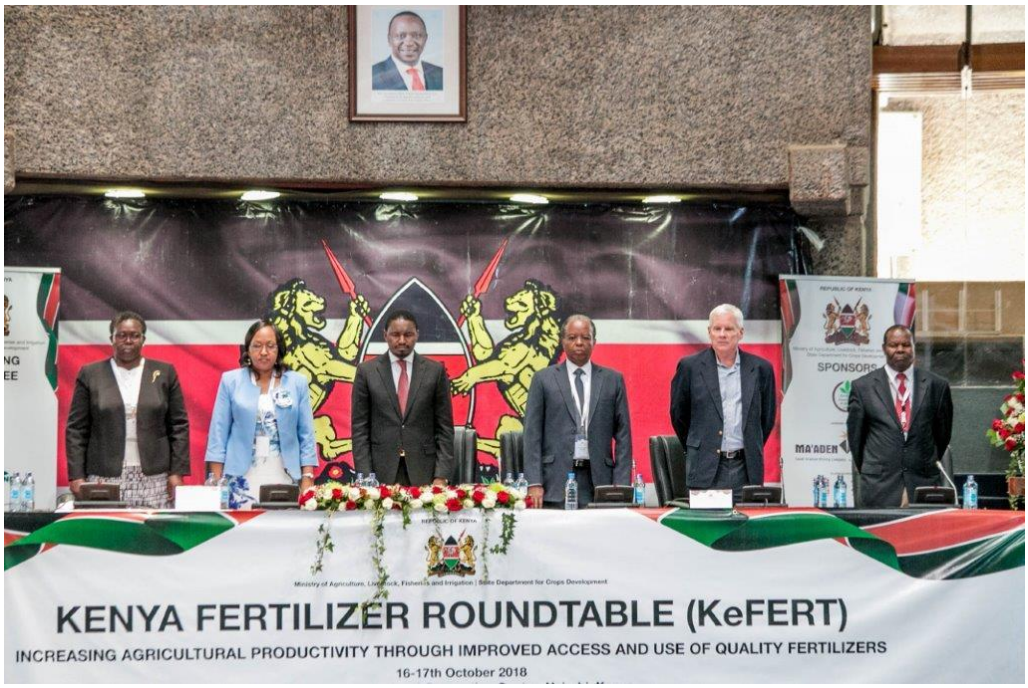
County	Farmers and Users	MoALF&I/ Govt Agencies	Private Sector	Research
Top Issues that Need to be Addressed in the Fertilizer Sector				
Fertilizer affordability	Fertilizer counterfeits	Policy framework/Fertilizer quality	Timely availability	Review regulations
Subsidy program to be addressed	Fertilizer prices	Fertilizer costs	Fertilizer subsidy restructuring	Subsidy reforms
Need for fertilizer area/crop specific	Liming	Subsidy study	Quality control including traceability	Soil liming
Infrastructure to improve marketing	Field Extension strengthening	Soil testing	Enabling environment through policy	Crop/area specific fertilizer development
Mandatory soil testing	Crop/area specific fertilizers		Promotion through Education of farmers	improved communication Govt/Private sector
	Subsidy accessibility			Training research and extension
	Strengthen regulations			Soil and plant testing
				Soil mapping
Do You Think Having a Fertilizer Platform is a Good Idea				
Yes	Yes	Yes	Yes	Yes

How Should It Be Set Up				
Include all stakeholders	All stakeholders	National chair and Co-Chair	Guidance by white paper	Multidisciplinary
Guided by existing legal framework		Full time Secretariat		
A framework to guide				
address the felt need of the sector				
Who Should be Its Members				
National Government	Farmer Association – KENAFF		FAK/AAK/STAK/ MoALF&I/Farmers Associations/Agro-dealers/Research/KEBS/ KEPHIS/COG/ Development Partners, Financial Institutions	Research
County Government	Distributors			Extension
Private Sector	KEBS			Policy
Research Institutions	Research			Farmers
Farmers Representatives	MoALF&I			University
Financial Institutions	COG			Communication
	Private Sector			Resource mobilization and marketing
	Leadership – Senate/MPs			
	Development Partners			
	Financial Institutions			

How Will It Operate				
MoALF&I to host	2 levels – National/County Govt	FAK – Chair MoALF&I – Vice Chair	Chairman – Tegemeo as Neutral	Self-regulating
Secretariat	Rotational meetings – County/National		AGM once in a year	Self-regulating financing mechanism like AAK
Steering committee			Special meetings on need basis	Secretariat of 1-5 representatives of Key stakeholder – Research/Govt
Funding by MOA/Development partners/Private sector			Secretarial for day to day management	Steering Committee of Max. 10 members
			Fund mobilization	
Nominated Member to Represent to Finalize Platform White Paper				
Mathew Wanjala – CEC Bungoma	Daniel Mailutha – KENAFF	Simon Muchingiri – MoALF&I	Eustace Muriuki – FAK	Anthony Esilaba – KALRO
		Lilian Kirimi – Tegemeo		

9.6 Conference Photos

Cabinet Secretary and KeFERT Organizing Committee Members



Cabinet Secretary with Key Speakers

Researchers Break Away Group

Key Presenters with Cabinet Secretary

Group Discussions – Research Group