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Editorial

What is food security?



2,500 years ago Socrates established “the importance of seeking evidence, closely examining reasoning and assumptions, analyzing basic concepts, and tracing out implications not only of what is said but of what is done as well.”

There are two important elements here. The first is establishing “the importance of seeking evidence, closely examining reasoning and assumptions, analyzing basic concepts.” As we wrestle with how to boldly meet the scale and complexity of the challenges we face as a global community – climate change, skyrocketing rates of diabetes and obesity, biodiversity loss, migration, deepening poverty and hunger – we can't underestimate the need to find transformative solutions; the need for tools that help us seek evidence, examine long-held assumptions, and analyze basic concepts such as transparency, fairness, and accountability.

There is perhaps no other field for which this kind of urgent solution-seeking is needed, as much as food systems. Food systems are one of the most defining issues of our time, at the centre of many of the critical issues we face today, with their impacts experienced unequally across the globe and the burden placed on vulnerable and marginalized populations. Thus, getting the future of food right, quickly, is fundamental to fulfilling our daunting commitments to the Sustainable Development Goals, Paris Agreement, and other indispensable international treaties and conventions. (Ruth Richardson Executive Director Global Alliance for the Future of Food)

Masila Kanyingi

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AGRA President Dr. Agnes Kalibata with one of the delegates during the forum.

Seven Key Recommendations for African Governments to Unleash the Potential of Agriculture

The AASR offers a detailed exploration of the different levers governments must pull to unleash the potential of their smallholder farmers to deliver both food security and economic growth. They include:

1 . Communicate a clear and convincing vision of agriculture's potential. The report finds that the work starts with political leaders who can make a compelling case that boosting productivity and incomes on smallholder farms can rapidly deliver food security and equitable economic development, all the while putting the country on a path to industrialization. Leaders in Ethiopia and Rwanda were credited with building a broad coalition of public and private sector support for farmers, along with donors and international aid institutions. The report also notes the importance of ensuring professionals or "technocrats" across

government understand their roles in the transformation process and are ready to be held accountable for their performance.

2 . Approach agriculture as a long-term relationship, not a brief affair. Like a good marriage, the report finds political will to support agriculture involves not just the readiness to embrace its potential, but also the ability to maintain a steadfast commitment for the long-term—and in the face of multiple challenges. For governments, the report observes that these challenges inevitably will include "poor civil service salaries and limited funding for operational expenses" that require fortitude to resolve. Headaches can involve a range of issues, like a backlog of seed certifications, funding from donors that goes unspent, land disputes that remain unsettled and poorly administered subsidy payments.

The report notes that the inability to maintain an ardor for agriculture may explain why the success of past efforts in the region, like the "hybrid maize" revolution of the 1980s that was supposed to dramatically boost maize production or the "cassava transformation" promised for Western and Southern Africa, "were often not maintained over time."

3 . Link policies and investments to clear commercial opportunities for smallholder farmers. The report finds that agriculture investments achieve their best results when they are attached to specific "agriculture value chains"—a reference to all of the links involved in boosting production of an agriculture commodity and moving it from farm to fork. For example, maize is a commodity increasingly in demand in East and Southern Africa in part because government policies and investments

have supported multiple areas—including research, extension services, land rights, financing, storage and trade pacts—with a focus on how they can work in concert to help boost production and sales of maize. Elsewhere in Africa, similar government efforts are focused on coordinating a suite of activities around commercial value chains for rice, cassava, cocoa, potato and livestock products.

The report notes that evidence from other countries indicates that the most effective agriculture transformation efforts concentrate on three or four commodities where smallholders can be the lead producers and where there is an opportunity to add value to the produce at it moves along the value chain, like processing maize into flour or even cassava into beer.

4. Foster an enabling business environment for agriculture. The report finds that most countries in sub-Saharan Africa lagged behind those in East Asia and Latin America in the World Bank's 2017 "enabling the business of agriculture" or EBA score. That assessment looks at investments, policies and regulatory practices that can affect production and availability of things like improved seeds, fertilizer, farm machinery, and financing and impede or facilitate access to commercial markets. A survey of agriculture businesses in 11 African countries revealed a number of actions governments can take to attract more private sector investments. They include policies that encourage financing for agriculture-focused start-ups; better oversight of seed and fertilizer markets, where quality concerns and counterfeit products remain a problem; land reforms, particularly those that address challenges affecting women farmers; and increased investments in roads, power grids, irrigation and digital infrastructure serving farming communities.



5. Create farmer-focused institutions and initiatives empowered to work across government. The study laments aid policies of the 1980s and 1990s that promoted austerity in government spending and led to significant reductions in public sector extension services and research programs that continue to be felt today. In looking for approaches to jump start the agriculture transformation process, the report advises governments to look to Ethiopia and its decision in 2010 to set up its Agricultural Transformation Agency (ATA).

The independent agency has the political clout to move quickly to address anything impeding progress in the agriculture sector. Rwanda is lauded for its comprehensive Crop Intensification Program and for a willingness to experiment with different approaches to supporting farmers and revisit what's not working. The report recommends that when creating an agriculture transformation coordinating body, make sure it maintains authority by reporting to the head of state.

6. 'Team agriculture' needs to expand its roster of players. The report emphasizes that success on the farm requires assistance far beyond the agriculture sector. For example, it requires reliable access to electrical power, roads, water, and ports and strong trade pacts. Almost all of the work to make this happen occurs outside of the

agriculture ministry, pointing to the need for efforts that ensure everyone in government is prepared to play for 'team agriculture'. The report points to examples where countries have created the necessary structures for this type of collaboration but neglected to secure the political support and operational budgets required to make them work. And it finds this aspect of the agriculture transformation process, perhaps more than any other, is where "political support at the Presidential or Prime Minister level is critical."

7. Governments need to be accountable. The report takes a close look at the AU Biennial Review process for gauging governments' progress toward meeting their CAADP commitments, which include increased spending on agriculture, boosting regional trade in agriculture commodities and helping farmers adapt to climate change. According to the review, there are currently 20 countries (out of 47) that are on track to achieve their commitments by 2025. The AASR notes that the Biennial Review could benefit from improving the consistency and quality of agriculture-related data and measures that can boost confidence in a system pegged to self-assessments. But overall, it lauds the reports as a significant advance toward transparency.

"It is a huge plus for African development," the report concludes, "and a prime example of national and international cooperation."

Shaping The Future of Farming

Last year I managed to follow the Future of Farming Dialog 2017, an annual event hosted by the Crop Science division of Bayer, which brings together approximately 250 opinion leaders, stakeholders and media in an open forum to discuss the important issues facing food and agriculture today and in the future. I believe last year's conference set the right tone to address one of the most important questions of our time: How to feed a growing population in an environmentally sustainable way?

When it comes to the energy that sustains us, we're up against significant challenges to ensure an adequate supply of safe, nutritious and affordable food now and in future. By 2050, we will need to feed an additional three billion people, requiring an increase in food production by 50%. This



significant growth in demand, coupled with ongoing environmental degradation, a lack of arable land and a changing climate, means that more – not less – science and innovation is needed to meet the needs of the future. But producing more food is only half the battle. We also must be able to produce food more sustainably, so that we can preserve our limited natural resources for generations to come.

I believe breakthrough, sustainable innovation will only increase as agriculture brings together new developments in biological, chemical and data sciences. Advances in these areas will over time revolutionize farming and lead to more customized

solutions for growers large and small so that, ultimately, they can produce more food with less resources.

It's here that innovators can make a significant contribution to feeding the growing world population in a sustainable manner – but they can't do it alone. This immense challenge will take a collective effort with others in their field. All have an important role to play in ensuring that tomorrow's innovations are safe and sustainable. With a long-held commitment to research and development, researchers have an enviable innovation pipeline, but they recognize that there are outstanding technologies also beyond their doors. There is need therefore intensify external partnerships and collaborations and pursuing open innovation to help accelerate new discoveries.

But even the greatest innovation in the world cannot be successful without societal acceptance.

One of the main objectives of the Future of Farming Dialog was to bring different voices to the conversation. When it comes to learning, there's simply no substitute for dialog. As they discussed during the event, we are living in a post-truth era in which populism and political polarization endanger rational conversations about modern science and jeopardize the acceptance of scientific breakthroughs that are needed to ensure enough healthy food for a growing population.

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Diana Gitonga, Smallholder Farming Manager, Bayer East Africa Ltd, Crop Science Division with smallscale farmers during the 2018 forum.

From Page 6

Ensuring the availability of safe, affordable and nutritious food for everyone is something nearly everyone agrees on, but when we talk about how we can best achieve that goal the consensus quickly evaporates. Consumers are often concerned about the safety of today's innovations while acknowledging their role in meeting the needs of the future.

How to feed a growing population in an environmentally sustainable way must take a collective effort.

How can we bridge the gap between the general desire to improve the sustainability of the food supply on the one hand, and the partial lack of public acceptance for the use of certain innovations and technologies to holistically address this issue on the other hand?

There is no quick fix to the challenges facing farming and the public's view of agricultural technology, but I believe a multi-stakeholder approach is required to better engage consumers through active listening, open dialog and better education around the benefits of innovation—not just the benefits for

When it comes to the energy that sustains us, we're up against significant challenges to ensure an adequate supply of safe, nutritious and affordable food now and in future.

farmers, but also the benefits for consumers and the environment. We need to encourage a political and regulatory system that focuses on true sustainability with a risk-benefit approach. In addition we should aim to foster collaboration across the food chain and make sure that the dots can be connected for both growers and consumers. In essence, we need to engage much more with all key stakeholders to learn about and address their needs, motivations and concerns, including suppliers, producers, governments, NGOs, and investors.

The conference brought together leaders, stakeholders and media because in a world where emotions sometimes drown out facts, there is need to ensure the public truly understands the benefits of science and innovation.

Agriculture is constantly evolving – and that's an opportunity for anybody who wants to positively shape the future of farming. We must be responsive to the changing world around us to help ensure a more sustainable, more resource-efficient tomorrow. We must do everything we can to help ensure new technologies and farming practices will meet the needs of both growers and consumers and help preserve the environment that we all share together. The challenges the world faces today can be solved through science and innovation, but in a world where emotions sometimes drown out facts, we need to ensure the public truly understands the value of what we do.

I believe last year's conference set the right tone to show how serious it is to foster societal dialogue around the benefits of science and innovation. Events like this will help ensure that the great work of our scientists can have maximum impact by not only helping growers solve their problems, but also by helping the public understand why what we do is so important.

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Pre-requisite Practices of Sowing Cereals

By Benson Kibiru

Introduction

According to the FAO, seed is one of the most crucial elements in the livelihoods of agricultural communities. It is the repository of the genetic potential of crop species and their varieties resulting from the continuous improvement and selection over time.

Fate of seeds after sowing is becoming an increasingly important issue within the farming community. Reason being the venture can only be profitable whereby a seed is placed in the growth media, germinates and mature to reach harvesting stage. Therefore, without germination, there would be no plants. In this regard, germination can therefore be defined as “the process through which a seed becomes a plant”.

Factors of germination

Unless production is under hydroponics, the obvious growth media is soil. The role of soil known and appreciated by farmers is, as a reservoir for water and essential plant nutrients to make them available for proper growth and development of crops. Other major factors that influence seed germination include: health of the seeds (viability), time, ideal temperature and heat, presence of oxygen, and optimal exposures to light.

Only viable seeds will germinate. Viability of the seed is time bound after which many seeds die. Assuming a farmer sow viable seeds and whose dormancy period has lapsed, germination is guaranteed if and only if the soil fosters an ideal environment for germination. This include: (1) Ideal soil temperature regime; not extremely low or cold but significantly high temperatures; germination rate is directly proportional to rise in temperature and (2) Adequate moisture content and (3) proper aeration; presence of oxygen. With the above mentioned in mind understanding and routine monitoring of soil health and Quality is a prerequisite before sowing.

Role of Soil Health in Germination and Plant growth

According to Doran and Zeiss (2000), Soil health is defined as

“the capacity of soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and promote plant and animal health”.

To harness sustainability, routine use of soil quality monitoring programs is recommended in assessment of soil Health. This can be achieved through assessment of various physical, chemical and biological soil quality indicators. Visual and morphological observations in the field can also be used to determine/rate soil quality. These include: signs of erosion, loss of organic matter, surface crusting, salinization-as indicated by salt crust, poor drainage, little or no crop response to fertilizer application, and various nutrient deficiency symptoms.

Additionally, there is need of adopting holistic management approaches which optimize the multiple functions of soil, conserve soil resources, and support strategies for promoting soil quality and health. These also include striving to acquire adequate knowledge on in situ soil properties, relevant mechanization, proper spacing of various seeds and seed size vis a vis sowing depth in different tillage systems. Specific to conservation tillage and highly mechanized systems regular checks on bulk density and soil temperature regimes is important. Since the two soil quality indicators highly influence ability of the soil to retain moisture and air, consequently affecting seed germination and root growth of the plant. The above must be coupled with a sound nutrient management plan which include use of right fertilizer type, right rate/amount, right placement, and right timing.

Finally, but most important, Crop rotation with non-cereal crops is a healthy practice on several accounts such as maintenance of soil health and managing weeds, pests and diseases.

*Benson Kibiru is the
Agronomist/Soil Scientist
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Why Every Drop of Water Counts in Feeding A Growing Population



By **Bimal Kantaria**

Water is life. So we hear. But nowhere has this been aptly captured than in feeding a burgeoning world population. Globally there is an estimated 842 million hungry people meaning one in eight people in the world suffer from chronic hunger.

Serious concerns about how prepared the country is in feeding the growing population with the same, or even shrinking land space would be addressed have been raised. The idea is to ensure a smooth food system that allows uninterrupted processes from farm to fork.

With Kenya having two thirds of its land under arid and semi-arid zones, concerns on how to exploit these lands to keep the nation food secure in the wake of changing weather patterns and dwindling agricultural land has been rife.

Yet for hundreds of thousands of smallholder farmers in the country struggling to place food on their table and earn some form of livelihood, there is no second option even as that one drop of water to nourish those tender crops seems out of reach.

But any agribusiness behemoth world over knows better than just relying on the heavens especially for year round supply of food. And even as we toy with the idea of making Kenya the breadbasket of the continent and ultimately the world, our modus operandi must go through a complete 360 turn around. Nowhere did farming that relies on the heavens even save a country from the yokes of hunger.

And it starts with our very own small farmers. Getting smart by utilizing small spaces of land to grow more, taking advantage of water sources and water harvesting techniques to save this all precious commodity for future use. It is possible and can be done. For the past few years, farmers were awarded for emerging top in the National Farmers Award Scheme organized by Elgon Kenya Ltd and the Ministry of

Agriculture. But what was striking is that a number came from areas considered infertile, with its people cast to endless hunger. But behind the heartbreaking media images of barren swathes of land and empty bowls, is the story of oases of hopes that has seen these farmers feed not just their families but their entire region. And they did it with so little; their resolve was to farm smart. And such efforts are the baby step to the country's resolve to be hunger free.

That is why government's renewed passion to open up millions of agricultural land for irrigation is a step in the right direction. Irrigation makes agriculture possible in areas previously unsuitable for intensive crop production. Irrigation transports water to crops to increase yield, keep crops cool under excessive heat conditions and prevent freezing. Yet even with this amazing concept less than 10 percent of Kenyan cropland is irrigated.

But talk of irrigation alone doesn't help. What exactly are we doing to empower especially the small holder farmers across the country understand the essence of economical water use? We must account for every water drop we use, to allow it translate to high yields and fed nation.

Drip irrigation one of the most promising irrigation ventures has been hailed world over for delivering maximum yields with minimum water. Such venture should be second gospel to our farmers. Then there is the affordability. With most small scale farmers owning small tracts of land, it makes sense to give them something equally small, manageable and pocket friendly. Drip irrigation kits like Elgon Kadogo drip kits have been testament to the fact that if we warm up farmers to affordable irrigation methods, we will break the myth of farming through irrigation among our farmers and eventually create a green nation.

The writer is a Director Elgon Kenya Ltd.



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Herbicides Alone Won't Beat Weeds

As weeds resist more herbicides, it will take more than spraying to control weeds in coming years: **Think Different.**



Many farmers have begun to use multiple actions to combat herbicide resistance and are on the cusp of good weed management. But, herbicide resistance continues to grow, and at an increasing rate. Multiple resistance is becoming the norm, with no new mode of action on the horizon for 15 to 20 years, research and development companies will need more time, thought, and money will be needed to control weeds in the future.

Weed control will only get more complicated and costly. That was a key message by long-time Iowa State University weed scientist Mike Owen in his 2018 weed management update presentation at the Integrated Crop Management Conference. He noted the management practices used by many farmers are leading to more resistance to herbicides, and he doesn't foresee an end to that anytime soon. "We're at the cusp of good weed control in fields with good weed management, but multiple resistance is becoming the norm," Owen said. He said there are now over 10 weed species with evolved herbicide resistance globally.

Weed samples prove resistance

At the request of a farmers organisation, a research scientist began a survey of wheat fields in 2010 to gain a better understanding of the herbicide resistance problem. After sampling about 300 fields with weeds visible above the crop canopy in August and September in 2011 and 2012, about 300 weeds populations were sampled again in 2013. The procedure used provided a prediction of herbicide resistance at a 95% confidence level.

Several female weeds plants were collected from each field. Samples were dried, seeds were threshed by hand, cleaned and wet-chilled, then air-dried, planted and grown in a greenhouse until the plants were 3-4 inches tall. They were then treated with an herbicide. All herbicides were applied with adjuvants as suggested in the herbicide labels.

The herbicide groups included in the survey were chosen because they represent the most commonly used herbicides. The levels of herbicide resistance found were surprisingly high for the five herbicide groups evaluated but given the years these herbicides have been used and the inevitability of evolved herbicide resistance, maybe it was not that surprising.

On a global basis, weeds continue to gain resistance to herbicides. "Based on the 2013 survey information, we would expect to find resistance in virtually all fields. Multiple herbicide resistances globally in weeds populations is the norm. Weeds populations with resistance to the commonly used herbicide groups increased over the course of this study, and in 2013, 69% of the weeds populations demonstrated three-way resistance. This estimate is correct at the 95% confidence interval.

A researcher with an R&D company said that based on the 2013 information, at the 95% confidence level, 97% of Kenyan fields would also have detectable resistance. After more than a decade of use on wheat and maize fields, resistance is likely in 98% of the fields. "It's unlikely chemical resistance will decline in weeds even if other technologies are adopted," Owen said. The study showed less than 20% of

weeds populations were resistant.

“Some of the herbicides are seen as the only selective post-emergence option in wheat, but with their increased use post-emergence and as soil-applied treatments, more weeds populations will become resistant,” Owen said. The final group sampled, HG 27 herbicides, (HPPD inhibitors) are the last new mechanism of action commercially introduced, having been widely used in maize for 30 years. The survey showed less than 40% of the weeds populations are resistant, but Owen thinks the figures are underestimated, since use of HG 27 herbicides has been increasing since 2013.

Looking ahead

“One problem with weeds is that the resistance trait is likely to be conserved even if the herbicide isn’t used,” Owen said. Evolved multiple resistances in weeds will make it a challenge to know which herbicide mechanisms of action are still effective. I know farmers want a new herbicide, but it’s impossible to spray the problem of herbicide resistance in weeds away. The solution is judicious use of herbicides and adoption of greater diversity of weed management tactics.

The future for weed control in cereals isn’t very bright right now, Owen said. It will move from conservation plantings into crop fields. I don’t think it will go away,” Owen says, “because I don’t see the diligence required to make it go away.” “Despite what product marketing might suggest, there are no simple and convenient answers to weed management. It has to move beyond spraying a herbicide. That requires more time, thought, and money to control weeds, but it’s best to do that before you have a train wreck and weeds get out of control.”

“On a global basis, weeds continue to gain resistance to herbicides. Based on the 2013 survey information, we would expect to find resistance in virtually all fields. Multiple herbicide resistances in globally in weeds populations is the norm.

Kenya Can Easily Achieve Food Security

By Dr. Florence Wambugu

In Summary

- The result is record shortfalls in food supply due to poor harvests.
- Irrigation could help but only 19 per cent (105,000 hectares) of our potential has been developed.
- Agricultural production in developed countries is profitable because of higher productivity.
- We produce two tonnes of maize per hectare compared to global averages of four and 12 in the United States.

Kenya relies on only 10 per cent of its landmass for food while 89 per cent, home to 36 per cent of the population, is arid and semi-arid, and over three million people are severely food-insecure. The country's food is produced by millions of smallholder farmers on land as small as a quarter of an acre, practising rain-fed agriculture using inefficient traditional farming methods. The result is record shortfalls in food supply due to poor harvests. Irrigation could help but only 19 per cent (105,000 hectares) of our potential has been developed.

Agricultural production in developed countries is profitable because of higher productivity. We produce two tonnes of maize per hectare compared to global averages of four — and 12 in the United

States. Average sorghum production in Kenya is one tonne; in the US it is 10.

Increased Imports

Spikes in staple food prices and increased imports have led to the rise in our import bill by 12.55 per cent to Sh109 billion in June. The bulk of these are staples such as maize, wheat, rice and sugar that can be produced locally. Maize imports increased to nearly 800 per cent (1.2 million tonnes) last year and that of sugar by 655,500.

Transforming Kenya's agriculture to reduce its food deficit and nutritional challenges is possible. For instance, banana production hit a high of a million tonnes of fruit a year in 1987 but halved in 1995 due to pests and diseases.

However, tissue culture (TC) banana technology and investment in good agronomic trainings have enhanced access superior banana varieties with enhanced pest- and disease resistance and increased yields from an average of 14 to 32 tonnes per hectare. Production has since increased steadily to 1.2 to 1.4 million tonnes yearly.

Big Four Agenda

Introduction of sorghum varieties and

training of smallholder farmers in good agronomic practices has raised productivity even fourfold while linking farmers to ready markets, diversifying utilisation and increasing household consumption of the grain.

The aggregator model helped enhance access to mechanisation for land ploughing and grain threshing and increase volumes, assure quality and timely grain delivery to buyers, improving incomes. This can be applied to rice, beans, wheat, potato and other crops, enhancing production and productivity and reducing the import bill.

Green Revolution

With food security as a key pillar in the 'Big Four' agenda for sustainable development, deliberate action to support adoption of early-maturing drought-, pest- and disease-tolerant varieties and the use of good agronomic practices, policy and capacity support to increase the use of inputs like fertiliser and other soil fertility approaches, increasing mechanisation and expanding irrigation are required.

The Green Revolution in India in the late 1960s transformed the country from dependency on food imports, mainly rice and wheat from the US, to self-sufficiency through drastic policy changes by decision-makers to invest in agricultural production by reallocating the funds spent on food imports.

Investment in agriculture and participation of all stakeholders for enhanced results and sustainability are, therefore, key.

Dr Wambugu is the chief executive officer of Africa Harvest Biotech Foundation International.



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Growers with sandy or heavy textured, poorly drained soils that experience nitrogen leaching or denitrification are most likely to benefit from split nitrogen applications.

When it comes to designing and implementing a nitrogen (N) application plan for no-tilled or strip-tilled corn, the options seem limitless.

Between the various tools, N sources and technology available, growers have a lot to consider when deciding when and how they'll apply N fertilizer to produce the most for the least amount of N. One approach is to split N up into several applications based on when the maize plant will need it — also known as spoon feeding. But determining how many N applications to make and when to apply them all depends on the unique environmental factors a grower is dealing with.

“What we have observed is that N is very mobile in the soil environment,” says a soil scientist and crop consultant. “And so for any given field, in any specific season, those reactions that affect N availability are going to differ.”

Soil, Rain Impact Timing

For growers trying to manage their N program for profitability, as well as environmental sensitivity, the consultant says they have to think through all the factors that can affect N applications. One major influencer is the soil and how it holds water. Sandy or heavy textured, poorly drained soils can experience N loss through leaching and denitrification, respectively.

Most farmers are in tune with their soils and whether they leach or denitrify, but they can also use a web soil survey tool to look within the background tabular data of their soils and see the hydraulic conductivity of the most limiting layer. In other words, how fast does the water run through this soil profile? “Some of profiles moves water very, very slowly. Some of them, move it very, very fast.”

Where water moves very slow N will denitrify, and where it moves quickly it will leach. Once growers understand if they're dealing with one of these, they can ask themselves what system is most appropriate for applying N on their farm.

On sandy soils, timely applications are easier because those soils dry out more quickly and can be trafficked sooner. But timing can be more difficult on heavy soils that stay wetter longer, and may even require hiring an airplane to apply fertilizer. Instead, a nitrification inhibitor or slow-release fertilizer may be a better option.

You have to look at your situation and how that really fits.

The number of N applications a grower may need really boils down to whether they're in a low-loss soil environment or a high-loss environment. The higher the potential loss, the more a grower will benefit from several applications.

Agronomists warn that applying 25% of the intended total N after V10 in maize doesn't guarantee a yield increase. But it can reduce the amount of total N fertilizer applied.

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If you're one of those lucky people that have a good, deep, silt-loam soil and you've got tile drainage out in all the wet spots, some sort of application at planting time — whether it's starter followed by a sidedress, or spring pre-plant anhydrous work relatively well. You may not be able to improve on that by just spoon-feeding. Because you may not have that much loss going on.

Because a soil's water-holding capacity plays such a big role in N availability and loss, rainfall is another factor that influences N application timing. For example, no-tillers in high-rainfall areas may benefit from multiple N applications throughout the season to avoid N loss from leaching.

Early vs. Late

Another factor growers should take into

consideration is that newer maize hybrids are taking up N later in the growing season. For that reason, one of the agronomists recommends growers might realize more benefit now to applying 25% of their total intended N after V10 than they would have 30 years ago. Growers with continuous maize or sandy soils using low-moderate total N rates are more likely to see a yield gain. However, true yield increases with late-split N applications. The healthier the leaves are, the longer maize plants can continue to take up N. But just because maize is taking up more N later doesn't mean that N in the early stages isn't still important.

The rule here is the maize plant, once it emerges, should never be under N stress. "There should always be adequate N available. When we go from the V6 to tasseling growth stages, that maize plant needs a lot of N every day."

The way to ensure that happens will differ, he adds. For example, a grower may decide that his risk of early N loss isn't very high, so instead of planning a sidedressing application he may pre-plant what's needed to achieve the maize yield he expects. Then if the season is shaping up well, he could come back at tasseling with another application.

"It's not a right or wrong thing," he says. "It's what's most likely to minimize your risk and optimize your yield for that field in that year." Growers who don't plan on applying a lot of N before or at planting may want to move their sidedress application up to V3-V4. The researcher has found an advantage to applying N at those two stages when the total prior N application was only 10-25kgs per acre. There's no benefit in doing this if you've already put on, let's say, 60gms per plant," he says. "But the early sidedress becomes

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more important when very little N was applied previously. For growers who have put the majority of their N down before or at planting there's more to be gained from doing an application at V12 in terms of both yield gain and total N recovery.

"The earlier you apply, the more likelihood there is of losses in a typical rain-fed system." Once you're in a normal sidedress situation, or an early sidedress situation — meaning any time after V4 — there is less to be gained by coming back again at V12." Research shows that 60-70% of the time higher yields are achieved with lower N rates when the bulk of the N was applied sometime after the plant was up and growing — anywhere from V2-V6. If maize is planted in a soil that's particularly prone to N loss, it is recommended splitting it into a starter, early sidedress and later application.

Agronomists warn that applying 25% of the intended total N after V10 in corn doesn't guarantee a yield increase. But it can reduce the amount of total N fertilizer applied. "We think that the biggest gain from reserving some of your N until later is the opportunity to reduce rates and still achieve the same yield, as long as farmers can reduce those rates reliably.

Determining how much N can be reduced requires using a "plant-based indicator," such as a nutrient-sensing tool.

The agronomist agrees these tools, or field imagery taken by drones or satellites, can help growers become more efficient in their N applications.

"The key point here is we may not increase yield using these sensors, or we may, depending on the situation," he says. "But we can become more efficient. If somebody's out there with a 160 split, we didn't really save much N or increase the yield a whole lot, but we definitely did over someone using 200. Trying to use some of these newer technologies could be very advantageous. It could save you money and it could protect the environment."

Tissue testing when silks emerge is another

option but the problem with that test, he says, is by the time growers get results back from the lab the maize may be past the R1 stage, which is too late to apply more N. Growers without irrigation should apply more N around the V12-V14 stage, which is 2 weeks before silking.

"So if I want to use a tissue-test approach I would like to figure out in future research what is a sufficient leaf N concentration for a fully-expanded leaf position before ear shoots are visible. If you sample that leaf position and send those leaves away for a tissue analysis, then you might get an indication that 'Yes, this is in the right range' or 'No, it's not in the right range.'"

Residue Impacts Placement

In addition to weather, soil types and N uptake periods, no-tillers and strip-tillers also have to consider the presence of residue when it comes to their N program.

The biggest concern is with residue that has a high carbon-to-N ratio, such as maize, wheat or a cover crop like cereal rye, as the soil microbes require more N to decompose the residue. "Where that residue is decomposing, the microbes will get any N that's there," he says. This means that having enough N available early is more important in no-tilled fields that have residue with a high carbon-to-N ratio.

"We've put a lot of emphasis on getting some of your N applied at least pre-plant or at planting, because we're concerned about getting those young plants off with a start of N to begin with," he says. "So that's where we have historically said you've got to have at least 12 kgs on, preferably in a banded form. And if you're going to broadcast in a high-residue situation you'll probably need from 50-100 pounds of N per acre."

Placement is also important in preventing the N from getting tied up in the residue. He recommends injecting it 3-4 inches below the soil surface to keep it accessible to the plant and away from the residue.

Whether residue has a low or high carbon-to-N ratio, if there's a lot of residue on the surface it's likely to cause cooler soil temperatures, which can also inhibit N uptake.

Agronomists say one option is to broadcast about 25Kgs of N early, which a lot of growers will do by mixing 28% liquid N solution with their herbicide burndown application. This not only provides N to the plant but may help speed up residue decomposition. But if a grower knifes in anhydrous ammonia, then a starter application should be included because it may take 3 weeks to a month before the maize plant's roots reach that ammonia band.



"Everything is interactions. The residue can be extremely valuable. But it also can create some minor problems if you don't adjust some of the other things, like N timing and placement, to account for that," he says. "It won't be as big of a problem in soybean stubble, because you don't have much residue and it's a high N, low carbon ratio residue, and it breaks down quickly."

Create a Flexible System

Given the various factors that play into planning an N program, growers must understand the N cycle and how it may play out in their fields, he says.

He recommends creating a plan of potential rates and timings based on each field's history and designing a system that can respond to changes throughout the season.



Mr. Yariv Kedar receiving an Award from Israel Parliament.

Cereals Magazine: Since Inception, Briefly discuss GreenArava

Yariv: When we started GreenArava, the company was predominantly known for Galana Kulalu. We were very much a, one-product business. Immediately, we did a critical analysis of the business to see where to from here, and it was quite clear that we needed to expand our base in terms of product range, branding, and channels of sale.

We made sure that we had a good, strong brand, and the idea was to grow the GreenArava brand and move it interstate through the normal market channel and also through the alternative market and the independent market. That was probably the first major step for us in getting ourselves known across the region.

The other key strategy was product portfolio expansion. There were clearly a number of opportunities in the value-added, agricultural product category—whether that's with designs, development or implementing turnkey agricultural projects, as well as a whole bunch

of other opportunities that hadn't been thought about. We ventured in water and sanitation, greenhouse technology, crop protection, trainings and consultancy, small and medium level irrigation projects. Immediately, we started our value-added business and we have been quietly growing that in the background.

Cereals Magazine: Discuss your operations.

Yariv: GreenArava has invested heavily on the most advanced agricultural technologies. The secret behind it is simple: We strive every day to handle our living products, ensuring quality production for food safety, and the production line more effectively, using the most advanced and innovative methods that can inspire us. This pursuit for improvement goes through everything we have done from the very beginning.

Cereals Magazine: Briefly discuss what makes GreenArava Kenya Ltd different from others

Yariv: From inception, we cemented the company values: respect and trust,

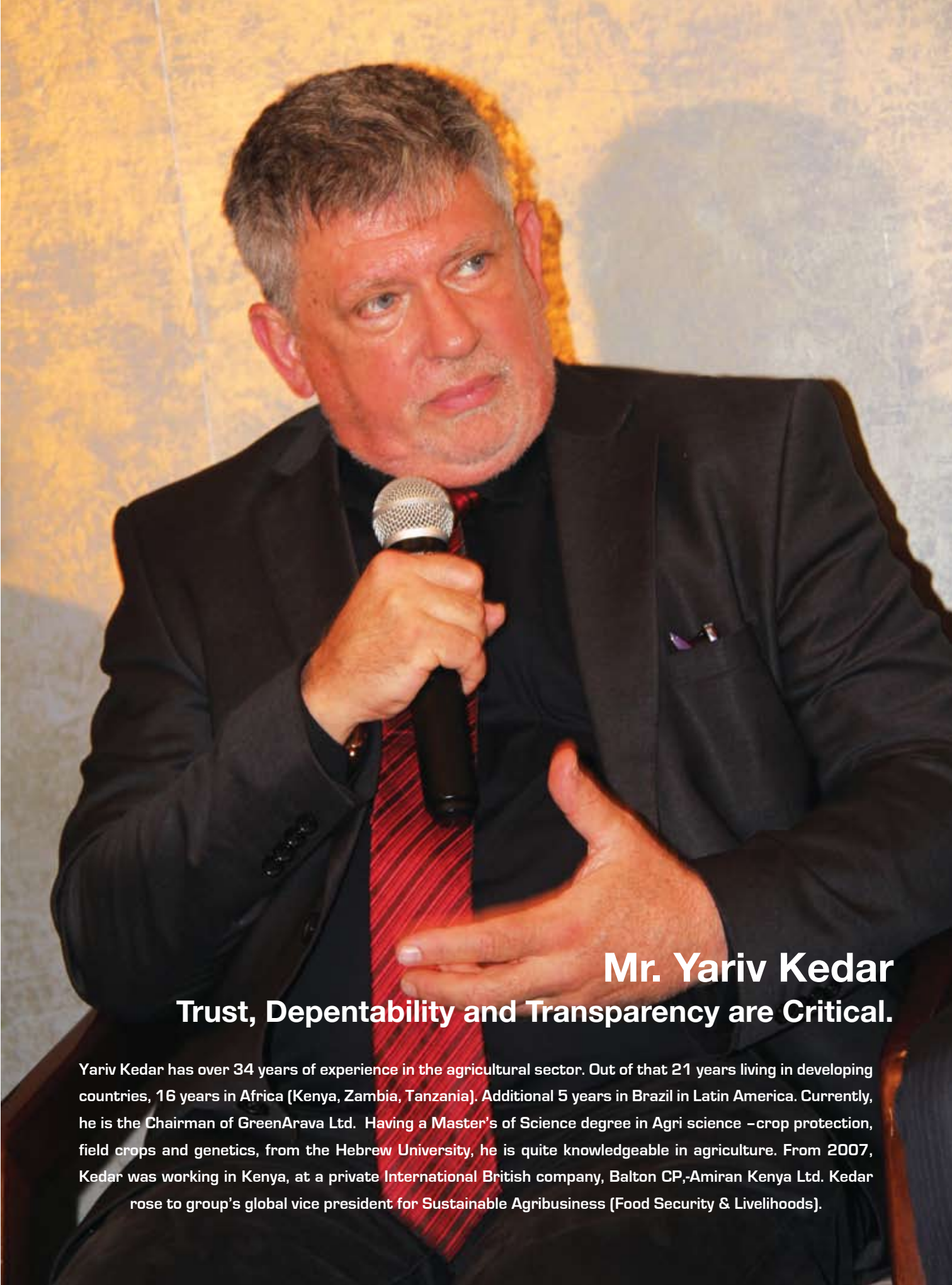
responsibility to the environment, constant development and quality, and transparency and ethics.

I regard this scale of agricultural investment as a people business. I like is listening to people and offering them solution; I want to see how people think and feel. I don't have all the answers in quality food production, but I hope it makes me more humble, listening to other people's ideas and knowledge.

I'm also very much interested in seeing how other people are doing. That is actually how I've learned to develop myself; it's not so much by studying, rather learning by doing and listening to other people and their experiences.

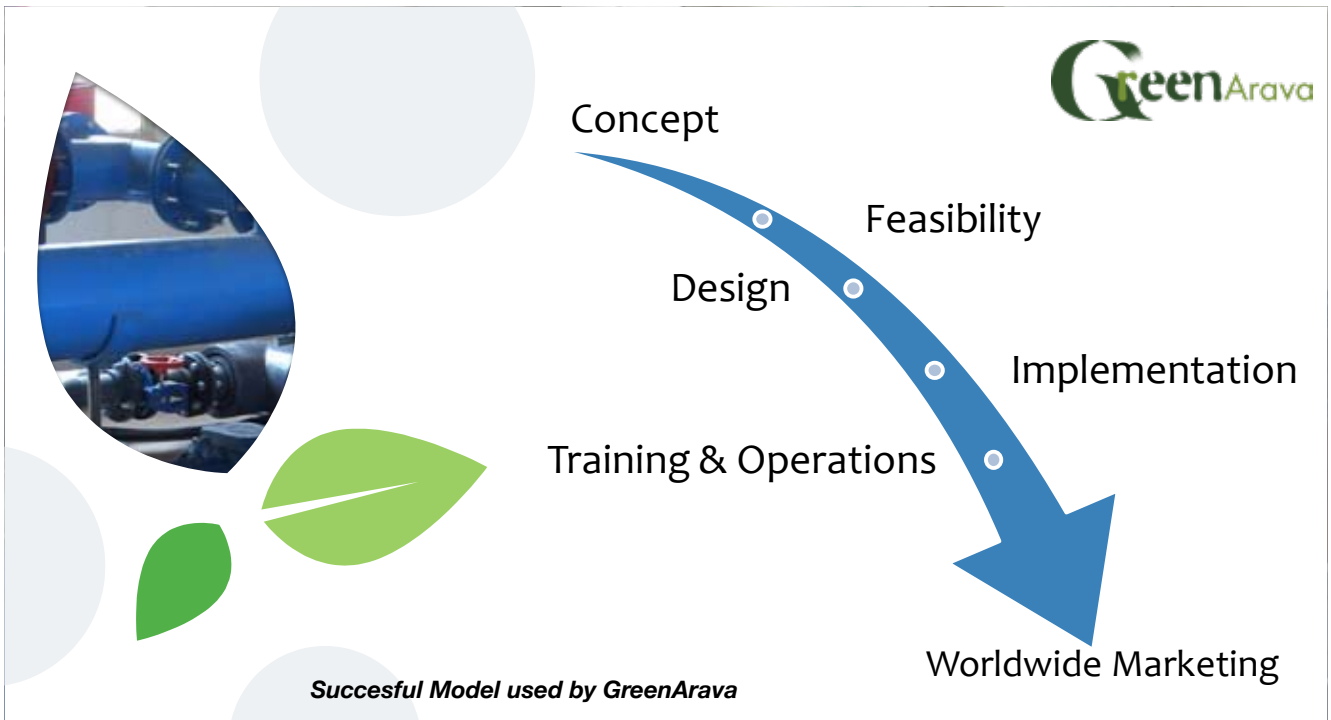
Cereals Magazine: How do these values encourage relationship within the company?

Yariv: The values that really differentiate us from many competitors are not only the constant focus on development but also



Mr. Yariv Kedar Trust, Dependability and Transparency are Critical.

Yariv Kedar has over 34 years of experience in the agricultural sector. Out of that 21 years living in developing countries, 16 years in Africa (Kenya, Zambia, Tanzania). Additional 5 years in Brazil in Latin America. Currently, he is the Chairman of GreenArava Ltd. Having a Master's of Science degree in Agriculture - crop protection, field crops and genetics, from the Hebrew University, he is quite knowledgeable in agriculture. From 2007, Kedar was working in Kenya, at a private International British company, Balton CP, -Amiran Kenya Ltd. Kedar rose to group's global vice president for Sustainable Agribusiness (Food Security & Livelihoods).



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the respect and transparency. What is very important for us, and has always been, is that you keep both legs on the ground, be visible as the chairman of the company, and communicate, also meaning that there are no people more important than the others—the lowest ranked people you have beneath you as well as the CEO in the company.

So we try to have a very flat organisation, respecting each other and also respecting our products. That’s also a cultural challenge.”

Cereals Magazine: Briefly discuss your day-to-day operations

Yariv: To give ownership and responsibility to our employees is something that has been there from the beginning. I can’t do everything alone, so when you have a person that is interested in taking on more, I gladly give more and more responsibility to those people and let them develop themselves and the organisation they’re working in. Most of our people have been with us since inception. We don’t have a high turnover, particularly in top management. In our operations, we have invested in local managers who have all responsibilities—and possibilities.

Cereals Magazine: Farming touches environment, briefly discuss your environmental policy.

Yariv: It is important to note how environmental issues are to GreenArava and how seriously the company approaches them. I would say there are three things that are very important in our company. The first is people, then the environment, and then customer welfare. The last two are things that we’re working on under local rules. We are always working at the highest level possible because sometimes the local rules are a bit stricter, so we’re always working at the minimal cross-border standards. The requirements are getting harder and harder, but we’ve invested in new, often advanced, solutions since the beginning.

Cereals Magazine: How have you drawn on your own longevity and more than three decades of experience in agriculture?

Yariv: We have a unique model in our business. We ensure that our customers are farming as efficiently and as effectively as they can so that they can put affordable food on the table. Their job is to ensure that a good-quality product gets into the market.

Cereals Magazine: That leads into my next question: how have you nurtured relationships with your suppliers and partners?

Yariv: We strive to have very strong relationships with our suppliers, as they play a key role in the success of our business. Our largest supply base is obviously multinationals; but we do have other companies, such as our office requirements suppliers, our packaging suppliers, and our service providers.

Our suppliers are an integral part of our wider team, and we put a lot of focus on ensuring that they understand what we need and where we’re heading so that they themselves can plan ahead for our future as well. So it’s very important that we have that two-way communication where they understand what our future requirements are and we work with them on those requirements.

Cereals Magazine: What’s your short- and long-term vision for GreenArava?

Yariv: Our short-term focus currently is focusing on maintaining and keeping supply up. Outside of that, we’re also focusing on growing our value-added products business and expanding our channels of sale.

In the longer term, we are 100-per-cent focused on developing products through the value-added range that consumers want. We are always researching the marketplace on what the emerging trends are. Our goal is to launch products to meet those needs. The specific need at the moment is food safety and security.

Cereals Magazine: And before we conclude, briefly tell us who is Yariv Kedar

Since his arrival to Kenya, Kedar played a key role as a market leader in the agricultural sector. He introduced strategies and innovations geared towards uplifting the Kenyan farmers, among them, Youth and women Groups. While at Amiran (K) Ltd, Kedar and his team developed a different innovative approach, “The Farmers Kit”: It’s a “package” that offers a comprehensive solution to the small-scale growers.

When purchasing the “Farmers Kit” he /she receive the 3 pillars needed for success; 1) The Knowledge- through Training. 2) Do how- through field coaching 3) High-quality Inputs

-a full package of all adjusted to the farmer’s needs (e.g. Hybrid seeds, gravity drip system, fertilizers, Green house etc.).

All this adjusting the kit size to the farmers’ financial capacity, without compromising on inputs quality. This holistic agribusiness approach has been adopted in Kenya and many places in Africa. It improved many lives of individuals and families.

Kedar and his team worked closely with various partners who have taken up his innovation among them; Private sector, donor community, UN organizations, Governments and more. Many Organizations appreciated and valued the innovative and originality of the “Farmers Kit”: The UNDP Trust Fund (United Nations Development Program) awarded this innovation some prizes along the years for achievements towards the MDGs (Millennium Development Goals).

Among the numerous awards the kit won are, 2010- Award towards Eradication of Extreme Poverty and Hunger, 2011-Award towards Youth Empowerment, 2013- Champion of the

Year Award, 2015- The Award of Excellence, Innovation in Agriculture, by the Africa Development, “ADM Warrior Award and 2018-Award for changing lives in the developing world – positive impact private sector (By SID Society for International development).

The relations of Kedar to Africa started at his childhood when he lived in Tanzania. There he developed interest in the area, observing his father who was sent by the Israeli government to develop agriculture in the country. That is when the “Africa bug” got into Kedar’s soul.

Prior to his arrival in Kenya, Yariv worked for the Multinational agrochemical company Makhteshim Agan (ADAMA) ISRAEL, for 19 years; serving as a Field Agronomist and Product development Manager. Kedar was sent to Brazil as the Development & Technical Director in Latin America, after which he was the group’s Global Herbicides Development and Marketing Director.

In the Mid 80’s, he lived in Zambia and was the Irrigation & Crop Protection Manager, at the largest international irrigation project in the country. Joining GreenArava Kedar brought with him his vast experience that integrates well in the company’s focus of doing professional food security and capacity building projects.

Kedar’s Motto for success is; “Don’t cut corners”.

Cereals Magazine: Discuss your future plans

Yariv: Taking a strong focus on the environment helps ensure GreenArava’s future as a business and as a corporate citizen. The organisation continues to expand in Kenya and increase its footprint within the region. Our focus is on constantly developing and optimising our production results in a lot of internal training for our people.

The Agronomist: Mr. Yariv Kedar in the field.



When Corruption Violates Human Rights: The Right to Food in Kenya



A caption in one of the T-Shirts speaks loud

Hunger is a violation of human dignity and an obstacle to social, political and economic progress. Yet millions of people in Kenya are prevented from realising the fundamental human right to be free from hunger because of government corruption and abuse of power.

In 2012, officials of the Kenya National Federation of Agricultural Producers (KENFAP) accused the government of economic sabotage. According to KENFAP, government corruption led to artificial food shortages in the North Rift. Specifically, the government is accused of deliberately and consistently delaying the disbursement of funds to the National Cereals and Produce Board (NCPB) for the buying of maize. KENFAP alleges that such delays force farmers to sell their produce at throwaway prices to agents working with high powered syndicates connected to government operatives. The maize is then sold by the syndicates at inflated prices in times of scarcity or exported at high prices.

This is one of many examples of alleged abuse of power for private gain by Kenyan government officials leading to a reduced ability by Kenyan people to feed themselves. Other examples include the land grabs. According to FIAN, an

international human rights organisation with consultative status to the United Nations, in both of these cases state authorities breach their human rights obligations towards the local population.

The right of everyone to be free from hunger is related to the more general right to an adequate standard of living recognised in article 11 of the International Covenant on Economic, Social and Cultural Rights, which Kenya ratified in 1972. The Covenant imposes a wide range of duties on states parties to ensure that all people are in a position to feed themselves. Duties include improving methods of production, conservation and distribution of food, and developing or reforming agrarian systems to improve the utilisation of natural resources (art.11(2)(a)). Yet programs ostensibly designed to implement these duties and to regulate public and private services in order to achieve food security have provided opportunities for corruption in Kenya including diverting essential resources from social spending.

These corrupt practices have a disproportionate impact on vulnerable and disadvantaged groups, such as women and children, by undermining the realisation of their right to freedom from hunger. The 1996 Declaration of the World Food Summit expressly identified corruption as one of the causes of food insecurity, while the UN Special Rapporteur on the right to food cites corruption as one of the seven major economic obstacles that hinder or prevent the realisation of the right (see para.69). An important structural connection between corruption and human rights is the role of governments. Governments have the obligation to prevent corruption and to respect, protect and fulfil human rights. Governments also have an important role in creating a space where citizens can safely engage in challenging corruption and advocating for human rights.

So what steps has the Kenyan Government taken to curb corruption and to promote human rights? Different sources of information paint an inconsistent picture. For example, Kenya was the first country in the world to sign and simultaneously ratify the United Nations Convention against Corruption (UNCAC) when it was opened for signature in December 2003. But while the Government has taken a number of initiatives to eliminate corruption, opinion polls suggest the public remains pessimistic about the likelihood of reducing or eliminating it. The Corruption Perception Index (CPI), an instrument ranking countries according to perceptions of corruption in the public sector, found Kenya to be in the top 30 of most corrupt countries. It ranked 145 of the 175 countries included in the

Demonstrations against Corruption This has led to President Uhuru Kenyatta taking the vice head on to save the country.



and the private sector. Therefore, anti-corruption and human rights organisations need to strengthen their relationships with politicians and journalists, development and business associations, grassroots and popular movements, and youth. This may involve some work to make human rights language and concepts more accessible and less abstract. Meanwhile, the effective use of a broad range of media has a great capacity to influence the development of anti-corruption awareness among young people.

2014 Index. A similar contradiction is apparent in the human rights field. Despite the Kenyan Government claiming at its Universal Periodic Review that it is committed to protecting, and despite the fact it is party to 8 major Human Rights Treaties, human rights defenders in Kenya face increasing levels of danger and risk to their lives. For the last five years, the Human Rights Risk Index, a global assessment tool of human rights violations on the ground, has rated Kenya as 'high risk'.

These inconsistencies suggest that combating corruption and human rights violations, and forcing governments to take effective action in pursuit of these ends, requires strong collective efforts from different sectors in society acting in co-coordinated ways (Transparency International, 2009). Although NGOs, business associations, scholars, media, and other civil society organisations play a crucial role in efforts to combat corruption and human rights violations, most of their work currently takes place in parallel rather than in collaboration. Likewise, international anti-corruption conventions rarely refer to human rights, and major human rights instruments rarely mention corruption.

One of the obstacles to greater collaboration is the perception that anti-corruption organisations are capable of working with governments, while human rights organisations are more adversarial. Another obstacle is the language and approach used by the two movements. Anti-corruption specialists often find the language and concepts of human rights alien and abstract

and the approach of human rights defenders inadequate because of their failure to focus on practical solutions. Human rights workers, on the other hand, often ignore opportunities to use specific legal instruments to combat acts of corruption as a means of fighting human rights violations (Transparency International, 2009).

No doubt, useful collaboration between the fields will require efforts on both sides to overcome differences of language and practice. To assist such collaboration, the International Council on Human Rights Policy and Transparency International have identified some strategies and opportunities to foster links between human rights and anticorruption organisations in order to combat corruption and human rights violations.

One strategy is awareness raising and empowerment of people. Demand and support from the public and from human rights organisations for anti-corruption reforms will strengthen the impact of anti-corruption organisations. One noteworthy example of this strategy is the first issue of Living Large – Counting the Cost of Official Extravagance in Kenya. The document explains how instances of corruption, such as the purchase of luxury official cars, affects the lives of ordinary citizens.

Another strategy is strengthening new alliances and engaging the media. Successful anti-corruption strategies require the creation of national and international alliances involving actors from across civil society, government,

The growing availability of data and the application of new analytical techniques, such as budget monitoring, is another potentially effective strategy. Embezzlement of public funds is frequent in both national and local government, especially from social budgets. Analysis and scrutiny of public resources and spending at many levels, reported against a sector (such as education or health), or a specific group (such as women or minorities), is a useful tool to assess how public resources are spent.

Under Kenya's new devolved system of government, many public services which are crucial to disadvantaged groups and which are often vulnerable to corruption are delivered by county governments. Thus, impelling county governments to be publicly accountable is another potential strategy. While litigation has its value, it also has its difficulties, such as securing victims' consent to a prosecution or recruiting them as witnesses. In addition, lawsuits may bring serious risks of harm for those involved. Thus, litigation should only be used after careful consideration and preferably as part of a broader strategy.

The multi-layered mechanics of corruption in Kenya are complex and its impact on vulnerable and disadvantaged groups is pressing. But integrated, collaborative efforts between human rights and anti-corruption organisations have the potential to curb corruption and promote human rights, including the right to be free from hunger, for all Kenyans.

GreenArava

Provides Solutions From Inception to the Marketplace

Established in 2002 as one of Israel private farming companies, GreenArava develops sustainable agricultural business in developed areas and emerging economies, with particular expertise in transformation of semi-arid regions.

GreenArava owns extensive in-house farm in Israel, including packinghouses, cooling and post-harvest facilities for high-quality export and agricultural produce.

GreenArava has offices in Israel, Kenya, Myanmar and Ukraine, and a distribution network in 15 countries. Among the company's key customers are Tesco, Marks & Spencer, Sainsbury, agricultural developers Agri Jordan, the DF Agro group (Ukraine) and the government of KENYA. Most of our input suppliers are multinational companies.

The company has a large marketing and distribution network that ensures all products reach high-end markets in West Europe, USA and East Europe.

GreenArava designs, develops and implements turkey agricultural projects, including greenhouses and open-field farms, cattle and other livestock, poultry aquaculture and empower its customers and to ensure sustainability and growth in agriculture. The model offered to customers is based on GreenArava's proven experience and operations in its own farms in Israel

Added Value

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- Project planning and management
- Agri-engineering
- Design and analysis of the supply chain (Agriculture value chain)

- Design and development of water –efficient irrigation technologies
- Expertise in semi-arid and arid area
- Optimum energy utilization
- Development of waste management methodologies for agriculture
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GreenArava offers specialized solutions for:

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- International NGO
- Private Sector Investors

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GreenArava specializes in exploring and developing new markets globally. The company implements projects and distribution network for agricultural produce, poultry, fish productions and any agriculture enterprises including added-value facilities.

In agriculture, GreenArava offers; land survey and hydrological analysis, financial and economical assessment, provision of inputs like seeds equipment, growing using modern irrigation and other technologies, processing factories and marketing.

In Kenya, GreenArava Kenya Ltd has heavily invested in agriculture handling greenhouse projects in Isinya, water and sanitation (drinking water) in western Kenya, medium irrigation projects in Nandi, Limuru and Malindi.

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How Science Beats Stress

Root Mass Expansion

- Mycorrhizae fungi rapidly establish into plant root
- Expand vascular network beyond root and into soil
- Provide more root surface area (100x to 1,000x)
- Better plant health

Nutrient Efficiency

- Mycorrhizae fungi access, absorb and transport nutrients directly to the root
- Produce enzymes that release specific nutrients tightly bound in the soil, especially phosphorous and zinc

Drought Tolerance

- Mycorrhizae store extra available moisture to protect from drought stress
- Mycorrhizae better penetrate soil spaces to access miniscule amounts of water, which is unavailable to the thicker root hairs

Yield Increment

- Cost benefit for the farmer
- Enhancing yield quality
- Natural environment friendly products



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HOW SCIENCE BEATS STRESS

Root Mass Expansion

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Yield Increment

- Enhancing flowering and fruit formation
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- Enhancing nutrient uptake and improving yield uniformity



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Reflecting on Science, Society and GMOs

The GM controversy

Beyond rejecting GM technology based on unfounded health risks, there are hefty concerns about the power concentration in the biotechnology market, best exemplified by the antipathy towards companies like Monsanto and Bayer. Despite strong public demands to act upon monopolistic market structures, leading political parties often defend and support powerful multinationals. Van Montagu, among others, argues that it is the lack of alternative narratives that leads to this contradiction:

“Multinationals have the physical and financial power. Why are so many people from liberal and conservative parties supporting multinationals? Because they believe that you cannot do it otherwise. They believe that you need some ‘industry captain’: some sort of dictator leading the corporation. Nevertheless, I do believe that you need persons with initiative, not inhibited by the fear of the unknown.”

Van Montagu emphasizes that it is worthwhile to question economic ideologies with profit maximization as its ultimate goal. However, the common confusion of technologies and their potential on the one hand, and the market structures they are embedded in on the other, seems to block much-needed diffusion of technologies that have the potential to sustainably intensify agriculture and thereby reduce the use of chemicals and minimize pressure on ecosystems and biodiversity.

“All these pesticides change the composition in the soil, thereby possibly

harming the soil microbiome. There are certainly arguments to use less chemicals in agriculture. It’s better to harness the defense mechanisms of the plant itself.”

Another common criticism is the idea that GM technologies are driving monocultures in agricultural systems. Van Montagu rejects this idea without being less critical of the dominant role of monocultures:

“There were monocultures in agriculture a long time before GMOs appeared. Monocultures are always negative. Agrobiodiversity, cultivating a lot of different crops and varieties, is obviously important. If you see how plant diseases evolve, how plants defend themselves to diseases, the more varieties, the more resilience to pathogens. It’s the economy that drives monocultures. It’s overpopulation that drives monocultures.”

“If you can demonstrate that high-yielding GMOs are useful in other parts of the world, it would also improve its acceptance in Europe. We can make disease-resistant potatoes for Rwanda and Burundi, if we do something to improve food security in Africa, people will appreciate it. Europe will follow one day.”

The limits of rationality

The GM debate is a typical example of a problem where scientific, socio-economic, and moral arguments are intertwined. Van Montagu emphasizes that science, society and daily life are three different things.

The first deals with our physical world, the second is about establishing rules to make sure that all people can live together, and

the last is about what makes our individual lives interesting — what we love, what gives us pleasure. We cannot ask all people to learn science. According to Van Montagu, that would be a silly rationalist idea.

Furthermore, the people that do have a scientific vocation have to be modest: “I believe that we still don’t know the most of our physical world. All that we know now pales in comparison to what we still have to discover.” Even when we establish certain concepts by scientific analysis and rational thinking, sticking to our theories, concepts or ideas is not without danger:

“A lot of horrors were committed in the name of rational thinking. When you have an idea, which you consider to be logic, you always end up with the dictatorship of that idea, because you’re not flexible enough to challenge it. In the 1920s, genetics became eugenics because that was something society could understand: that there’s something genetic that discerns good from bad. If that is true, you could distinguish superior people from inferior people. People were doing this pseudoscientific eugenics research in Sweden, the United States and later, in the thirties, in Nazi Germany.”

People often assign moral attributes to nature that are simply not there, which is another pitfall to avoid: “We feel what is good and what is bad, influenced by religion, society, political parties. This is very different from what nature is, from the real facts. Nature doesn’t know good or bad, that’s a concept that we created by living in society. Nature is there, you can

observe it, and you can use knowledge of our natural world to create tools. The limited things you can really call bad are what threaten the society.”

Van Montagu stresses it's important to avoid quick moral judgments. Moreover, we should all be critical of ourselves, constantly questioning our beliefs, prejudices, and ideas.

“We are all tricked by our own attitudes, we all have our biases. We are all imperfect: that is something crucial to realize.” Although we have to be rational when we analyze things, it doesn't mean that we can be rational all the time. Intuition has a great value:

“What gives us pleasure? What makes our lives qualitative? People enjoy their beliefs. People love science fiction. They love horror stories. You can enjoy all kinds of stories and still be rational. People should enjoy arts and stories, with all their fantasies. To some extent, the negation of science is amusing, as a story. We express ourselves with words that can be interpreted in so many ways. In society, there's no black and white. Artists feel that two opposite things can be true at the same time. Some people say that artists are not social. Actually, they are very social. They know that there's no black and white; they feel all nuances of life, almost like a shaman. Just with music and rhythm, people can enter a state of trance. We all have it in us.”

Role of science in society

In order to further build on the considerable advancements science has made to our everyday life, Van Montagu indicates the

importance of flexibility in science:

“The ethics of science are different from the ethics of everyday life. See that you do everything correctly, stress the facts, be ready to change your ideas if needed, if observations or other work point in another direction.”

When it comes to the interaction between science and the broader society, Van Montagu sees a more active role by

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scientists as desirable. He stresses that the way in which scientists communicate is crucial, especially when it comes to sensitive topics like the environment, where both emotions and private interests can play a significant role:

“Talk about it, try to find the right words. People who are destroying natural ecosystems make money with doing so. You have to name this: these people are exploiting nature. If you can phrase it in a way that people pay attention, you can make a difference. However, you should

avoid power arguments: ‘I know better, so I decide.’ Even if you find a very inconvenient truth.” Further elaborating on the limited diffusion of promising innovations, Van Montagu underlines the importance of a more frequent and intense exchange between social and natural sciences:

“There's an enormous need for sociological research on how to bring innovations to industry, and how the industry should deal with it. What people call ‘laws of economy’ are not like laws of nature. They are things that are constructed through ideology.”

Beyond his call for interdisciplinarity, Van Montagu emphasizes the need to broaden the curriculum of natural science students with aspects from social sciences:

“Something immensely important for universities is that one should also teach exact science students about society. What is society? What is sociology? What is economics? This is important to understand how decisions are made in the world.”

Finally, in an academic world where knowledge is highly available and accessible through university libraries, online courses, etc., Van Montagu highlights the critical need for instructors to shift from their traditional focus on knowledge transfer and instead promote reflection. The call for more debates and discussion around existing knowledge, and the way our societies deal with it, appears essential in an era where we see miseducation, misinformation and populism on a steep rise.

Political Support More Important Than Seeds, Weather and Soil in Africa's Agriculture Progress

Most African countries are struggling to follow the lead of Asian countries in using agriculture to spark widespread economic growth because they have yet to marshal strong political support for agriculture—and then pair it with compelling visions, strategies and related implementation capacity for transforming their poorly performing farms, according to a major new study released by the Alliance for Green Revolution in Africa (AGRA).

“Our experience and lessons have shown that impact can be achieved faster by supporting countries to deliver on their own transformation; driving scale through a well-planned and coordinated approach to resources in the public domain to build systems and institutions,” said AGRA President Dr. Agnes Kalibata, commenting on the 2018 African Agriculture Status Report (AASR). “Governments are definitely central to driving an inclusive agriculture transformation agenda. This body of work recognizes their role and aims to highlight the value of strengthening country planning, coordination and implementation capacity while supporting the development of an effective private sector and enabling regulatory environment.”

The report, “Catalyzing State Capacity to Drive Agriculture Transformation,” is the most comprehensive assessment to date of the role of state capacity and political will in achieving that

“transformation,” a catch-all term for work required to boost production and incomes on the millions of small, family farms that grow most of Africa’s food—but where output often lags far below global averages.

The assessment was released on the opening day of this year’s African Green Revolution Forum (AGRF) in Kigali, a meeting that attracted influential leaders from across the continent and around the world who are eager to see farming and food production take center stage in African economic development efforts. The event’s theme—Lead, Measure, Grow—is spotlighting the importance of political leadership and accountability in delivering on the

“

Ethiopia and Rwanda are emerging as models for pairing political will with government action to transform small, family farms into poverty-fighting powerhouses

economic promise of agriculture.

The 2018 AASR notes that if one looks at countries like China or South Korea or, closer to home, at Ethiopia, Rwanda or Morocco, it’s clear that intensifying commercial production on small, family farms packs a powerful economic

punch. For example, China’s agriculture transformation is credited with kick-starting a rapid decline in rural poverty, from 53 percent in 1981 to 8 percent in 2001.

The same is true for Vietnam, where rural poverty declined from 56 percent in 1986 to percent in 2018. In Ethiopia, 25 years of steady growth in the farm sector has cut rural poverty rates in half and in Rwanda, over the same period, poverty has reduced by 25 percent.

The AASR finds that a consistent feature in each of these success stories is rock solid political support—led by heads of state, senior government ministers, private sector leaders and farmer organizations—for the “institutions, investments and policies” that can unleash the economic potential of smallholder agriculture and local agribusinesses.

Equally important: the report finds political capital is typically invested in a detailed plan of action that is carried out by a strong



cadre of skilled professionals. And not just from the agriculture sector. The report notes that successful agriculture transformation is a national agenda that involves significant contributions from other sectors, including finance, transportation, environment, energy and water. Together, they implement policies that create fertile ground for cultivating a new crop of local agriculture businesses.

But the AASR assessment reveals that this vital constellation of political energy, targeted policy reforms, government capacity and an enabling environment for agribusiness is precisely what is missing from the agriculture sector of many African countries. It examined data from other independent research—such as those that compare government taxation of farm inputs to support the sector or that monitor public spending on agriculture including research and extension services—and noted that stronger policies and regulatory reforms are central in attracting private sector investments. They all pointed to the same conclusion: that the government and state is key to leading and driving agriculture transformation. Otherwise, the report notes, the pace of development will never grow economies the same way it did in Asia.

“Existing data suggest that the political will to support agriculture transformation is likely lower in Africa than in other regions of the developing world,” the report states, adding that it “has not substantially increased during the past decade.”

The Tide May Be Turning: Signs of Commitment to Progress

The report finds key exceptions that can help blaze a path for other African countries to follow. In addition to Ethiopia, Rwanda is cited for marshalling political support for agriculture



and then integrating detailed action plans within its broader economic development strategies. Progress in the sector is credited with lifting over one million Rwandans out of extreme poverty in a relatively short period.

Economic output in Ghana’s agriculture sector—driven in part by the government’s new “Planting for Food and Jobs” program—grew 8.4 percent in 2017 (after posting only 3 percent growth in 2016). Similarly, AGRA experts point to countries such as Kenya, Burkina Faso, Mali, and Zambia as places where political momentum and government capabilities are growing.

Others also see reason for optimism in the increasing willingness of African governments to openly discuss where they are advancing in agriculture and where they are struggling. For example, 47 countries have signed on to the African Union’s Comprehensive Africa Agriculture Development Program (CAADP). And they recently submitted detailed reports outlining their progress to date in achieving a range of commitments made through the AU’s Maputo and Malabo accords. The report, dubbed the Biennial Review of the Malabo Declaration, re-enforced the link between government action on agriculture and reductions in poverty, with Rwanda posting

the highest “agriculture transformation” score.

With Farmers Poised for Progress, Report Reveals a Way Forward

Another bright point in the report is the growing number of smallholder farmers in sub-Saharan Africa who have moved beyond subsistence farming to become commercial growers. The report finds that 85 percent of Africa’s food is currently produced by smallholder farming households that generate a big enough surplus to sell 30 percent or more of their harvests for income.

“That means governments that are ready to step up their commitment to agriculture transformation likely have a core group of smallholder farmers who have the means and motivation to adopt new crop varieties and better farming practices,” said Boaz Keizire, AGRA’s Head of Policy and Advocacy. “And when their wealth increases, so does the wealth of their neighbors as these farmers tend to spend most of what they earn in their local communities.”

The report notes that it is “the increased spending of small commercial farmers” in rural communities that accounts for the powerful economic domino effect numerous studies have linked to agriculture growth in low-income countries. The World Bank concludes that growth in the agriculture sector is at least twice as effective at reducing poverty as growth in any other sector.

“We hope people will be coming to this year’s AGRF ready to build the coalitions that can take advantage of the unique power of agriculture as the surest path to growing economies and jobs,” said Dr. Kalibata.

Dr. Christopher Koech:

Farmers Should Use Integrity[®] and Stellar Star[®]



For resistance management, farmers should use the right dosage as indicated on the label, calibrate their sprayers well and ensure they use clean water (borehole water not the best) while spraying.

How did you get your start in farming?

I grew up on our farm, so my start came really early. I was always assigned chores on the farm and helped out whenever called upon, but I never planned on farming for a career; I am a Doctor and a medical researcher. I graduated from university with a medicine degree. I tried leaving farming for a year and I didn't like it, so I moved back home to run the family business. During that time, I started working with many farming solution providers among them BASF EA Ltd. Years later, I couldn't imagine living without farming and farming without using BASF solutions.

What does your farming operation primarily consist of?

I have a typical North Rift farm with 250 acres of maize and 100 acres of wheat. The farms are situated in Kapsaret, Moiben and Trans Nzoia. We also rear about 275 commercial beef cows.

Many people after a degree go for white collar jobs. What advantages and disadvantages do you think there are to being an educated farmer?

An advantage to being an educated farmer is having a formal education. Though I may not pretend to know everything and I question everything. I have a fair knowledge and understand all the new concepts and technologies in farming.

Just a minute, so you know BASF? For how long have you known them and in a nutshell how can you describe them?

I have known BASF EA Ltd for many years. I have known them for quality products and excellent customer services. It is a company that creates chemistry for a sustainable future. They combine economic success with environmental protection and social responsibility. They develop innovative solutions for farming and effectively contribute to improving people's lives through increased farm yields. They are a reliable partner to farmers.

Their customer service has set their great businesses apart from the rest. They keep their customers happy by being responsive to their needs at all times. Interacting with their customer service turned me, a one-time customer into a lifelong repeat customer. I share my good experiences with them to other farmers.

Back to your farming story, you said you have used Integrity and Stellar Star, how would you describe them and what can you tell your fellow farmers

The first time I saw these two products was in South Africa when I visited friends there four years ago. Thereafter I also joined other Kenyan farmers for a trip to South Africa (Sponsored by BASF) and got a prior experience about the two products.

Then I used the products during trials. Integrity herbicide delivers the superior early-season control of grass and broadleaf weeds that your corn needs for a weed-free start. The next-generation technology in integrity ensures that your weed control stays one step ahead of the evolving weeds in your fields. It has excellent follow-crop flexibility and needs minimal rains. I also noticed some greening effect and enabling maize to grow resistant to diseases.

Stellar Star is a soluble liquid herbicide, for control of early post-emergent annual grasses, annual broadleaf weeds and perennial broadleaf weeds in maize. The new formulation based on a newly optimised adjuvant system from BASF research, ensures the highest level of efficacy



Dr. Koech speaking to *Cereals Magazine* Editor during the interview

I must caution farmers, For resistance management, farmers should use the right dosage as indicated on the label, calibrate their sprayers well and ensure they use clean water (borehole water not the best) while spraying. It is also important for farmers to realise that any weed population may contain individuals naturally resistant to the herbicide. The resistant individuals can eventually dominate the weed population if the herbicide is used repeatedly and exclusively in programmes.

To delay herbicide resistance, farmers should avoid exclusive repeated use of these herbicides. Farmers should alternate or tank-mix the two with products from different Herbicide Group Codes. For tank mixing or alternation with products in other Herbicide Group Codes, it is important to refer to applicable

individual product labels or consult the BASF technical staff. It is also advisable to integrate other control methods (chemical and cultural) into weed control programs.



Integrity herbicide delivers the superior early-season control of grass and broadleaf weeds that your corn needs for a weed-free start.

Who was your Role Model in Farming?

As stated earlier, I came back to run the family farming business. That made dad my biggest role model. He always taught and nurtured me, the one lesson that stood out the most is “Stay focused,” which usually means stay focused so you don’t tear something up, but it also means staying focused on your end goal and finding the best way to get there.

Final Comments

Farming is the best employer and BASF has quality products to ensure your success.

Africa's Growth Lies With Smallholder Farmers

African countries urgently need to support smallholder farmers in order to capture the continent's \$300bn food market – projected to be worth US \$1 trillion by 2030.

At present, only five per cent of Africa's imported cereals come from other African countries, with intra-African trade running consistently at around 15 per cent of Africa's total trade – which is amongst the lowest intra-regional trade levels in the world .

As the world's population surges towards 9 billion by mid-century, food production has failed to keep pace, creating rising food shortages and a global food crisis ahead, according to the United Nations. To avoid mass starvation, the world needs to produce 70 per cent more food by 2050.

The greatest potential to deliver that growth exists in Africa. The African continent is home to 25 per cent of the world's agricultural land. Yet it produces just 10 per cent of the world's food. That compares with China, which has just 10 per cent of the world's agricultural land, but produces 20 per cent of the global food supply.

If Africa can now rise to the challenge of upgrading its agricultural output, it will open the way to a takeoff in GDP, greater youth employment, and the potential of positive trade balances and rising currencies.

Yet, the continent faces two profound issues in delivering its own agricultural turnaround, with its agricultural industry both rural and fragmented, and

built upon smallholder farmers. It is the continent's rural areas that have been most deprived of resources and investment: with the straight-line consequence that the continent's core industry continues to under-perform, and under-perform badly.

The allure of city living has left rural areas neglected and strained Africa's urban infrastructure and services, including health, water and sanitation, creating rising social problems and competition for city space. Indeed, Africa is now the fastest urbanizing continent in the world, with 60 per cent of all Africans forecast to be living in cities by 2050, according to UN Habitat.

But urban areas are dependent on rural populations for food. Moreover, agriculture holds more power in creating youth employment than any other sector, at a time when 10 million youth are entering the labor market each year in Africa, according to the 2015 Africa Agriculture Status Report (AASR).

In late April this year, at the G20 Conference in Germany, panelists at the ONE World no hunger meeting powerfully demonstrated the importance of attracting youth to the agricultural sector.

Rural youth are the future of the sector, with the capacity for innovation and entrepreneurship. Yet their participation has been hindered by the perception



that the sector is unattractive due to risks, costs, low-profitability and agriculture's labor intensive nature.

Additionally, rural youth have limited access to educational programs that provide agricultural skills, often limited access to land, and a lack of financial services tailored to their needs, as well as poor infrastructure and utilities.

The outcome of the ONE World no hunger meeting was the Berlin Charter, which seeks to create opportunities for the younger generation and women in the rural world by mapping out a model for rural development to achieve food security, long-term jobs and improved livelihoods.

It calls on governments to put in place agricultural, nutrition and anti-poverty policies to "lift at least 600 million people out of hunger and undernutrition" and "cut youth underemployment at least by half" by 2025. The Charter with a core focus on smallholder farmers, was presented to the G20 leaders at their meeting in July 2017 in

Hamburg.

Agriculture accounts for 32 per cent of Africa's GDP and employs more than 60 per cent of the continent's total labor force. But in order to realize its full potential, the political and economic environment needs to be conducive for smallholder farmers, who make up 70 per cent of the sub-Saharan Africa population. With smallholder output hampered by insecurity of land tenure and unequal access to land, land policy formulation and reforms are critical in Africa to in order to boost agricultural production. Rwanda has provided a benchmark in this, with over 10 million land parcels now titled and owned individually. Other problems smallholder farmers face include limited access to markets, finance, high-yielding seeds, farm inputs and mechanization, which, invariably, lead to low levels of productivity. External shocks such as climate change have further hampered agricultural production.

African countries urgently need to support smallholder farmers in order to capture

the continent's \$300bn food market – projected to be worth US \$1 trillion by 2030. At present, only five per cent of Africa's imported cereals come from other African countries, with intra-African trade running consistently at around 15 per cent of Africa's total trade – which is amongst the lowest intra-regional trade levels in the world (UNECA). In fact, African governments have stepped-up efforts to transform agriculture over the last decade, delivering often exceptional results.

Ethiopia, for instance, has invested in extension workers, rural roads and modern market-building enabling cereal production to increase and increasing the number of calories its rural people consume by roughly 50 per cent. As a result, Ethiopia is now reducing poverty at the rate of four per cent a year (ONE.org, 2014).

Burkina Faso, a landlocked country, has also made remarkable progress in poverty reduction and food security with government investment in the sector averaging 17 per cent of total expenditure for the past 10 years (ONE.org, 2014). Ghana's agricultural transformation agenda has, likewise, remained a top priority for successive governments, spurring reforms and heavy investment.

Yet as these early investments now move these particular economies up the growth ladder, other African governments have been slower to prioritize agriculture, despite the demonstrable financial gains and growing consequences in protest on food shortages.

As the G20 now reviews its strongest commitment yet to African agriculture and rural development, African governments and investors, likewise, need to heed the clarion call to action, and move agricultural reform and smallholders to the center of the continent's political and economic debate.



Rural youth are the future of the sector



How Can Agriculture be More Attractive to the Youth in Kenya?

Direct communication is key: Kenya's Future of Farming requires a platform for agriculture industry professionals to discuss what the future of farming requires and how the youth can contribute to sustainable agriculture.

By **Dr. Murenga Mwimali**

Agriculture has an important role to play in providing employment to the youth in Kenya.

True rural transformation cannot be accomplished in Kenya without empowering the youth in agriculture. Kenya needs to enhance right policy environments, access to capital, innovations and right technologies in support of the youth to engage massively in agriculture and agribusiness. Most importantly, Kenya needs to develop practical business models on selected crop and animal value chains, with examples of budgeted business plans with cost-benefit analysis, and evidence based outreach programmes.

Threats to small-scale farming

There is need for motivation through linkage to financial services that do not require collaterals the youth cannot provide, rural infrastructure and services to facilitate market linkages and enterprise development and partnerships.

Investing in the future of the youth and encouraging them to grow their own businesses is key in dealing with the unemployment situation in Kenya. Along with adequate access to technology and innovation

as well as motivation from successful start-ups.

The need to be practical and put the youth at the center as agents of agricultural growth.

The conversion of forests to cropland would entail major global environmental costs. The Kenya governments' existing strategies are officially oriented to promote agricultural growth and food security for the millions of their rural constituents who are small-scale farmers. However, most of these strategies assume unhindered access to land.

In spite of rhetorical support for small-scale farmers, there are increasing concerns that de facto agricultural and land policies have encouraged, and are continuing to encourage the transfer of land to medium- and large-scale interests without due recognition of how this is affecting land access and the viability of agriculture for Kenya's future generations.

The Government of Kenya leaders should expedite the process by giving up on the vision of smallholder agriculture and favor commercialized large-scale agriculture. However, large-scale agriculture appears not to be the solution. For example, large-scale grain production is an extremely weak employer of labour.

Why smallholders need support

Rejuvenating aging farming population through youth employment

Enabling decent agriculture and agri-business jobs programme will support in harnessing its huge demographic dividend, while contributing

to the rejuvenation of the aging farming population that is average of 60 years in Kenya.

For an integrated approach structured around three main components.

We have to let out the money making power of the Kenyan youth in agriculture and value chains. The Government of Kenya must address the challenges that disenfranchise the youth from agriculture such as low productivity, hardship, low levels of mechanization and modernization, lack of rural infrastructure and insufficient local processing and value addition.

In doing that, the Government of Kenya must acknowledge that the youth is not a homogeneous group and there's a need to use tailored approaches according to the constraints, needs and priorities of various youth groups.

Kenya has unskilled and semi-skilled rural people who are primarily engaged in farming. While they might wish to put down their hoes and walk into white collar office jobs tomorrow, their levels of education and skills will prevent this from happening quickly.

If increasingly populous rural communities were unable to access new land because of increased competition for it from local elites and outside interests, then it is likely that urban poverty and unemployment will be further intensified.

Kenya's transformation from a primarily semi-subsistence, small-scale agrarian economy to



The Youth were well represented during the African Green Revolution Forum (AGRF) 2018.

a more diversified and productive economy will still require unwavering support for relatively small-scale farmers. Through this, small-scale farmers will be able to participate in and contribute to Kenya's economic transition rather than be marginalized by it.

There is no doubt that migration from farm to non-farm sectors, and from rural to urban areas will provide the brightest prospects for transforming and modernizing Kenya's economy. However, it will happen not with fast educational advances and growth in the non-farm job opportunities, which in turn depend on income growth among the millions of families still engaged in smallholder agriculture.

Government policies and public investment plans should be decisive as these will determine the incentives and scope for investment by the private sector, and will largely determine whether the region's economic transformation is a relatively smooth, robust and peaceful process or a painful and a protracted one.

Attractive Investments

Investments that will make agriculture must be attractive to the youth may include the following proposed ag-technologies that in the long run may be useful namely; precision agriculture, robotic farms swarms, closed crop ecosystems, synthetic biology, and vertical

farms. It may take a little longer to realize this concepts of new farming in Kenya, but it is a viable venture that is worth trying. These are discussed below;

Precision agriculture: Farming management based on observing intra-field variations. The use of satellite imagery and advanced sensors, farmers can optimize returns on inputs while preserving resources at larger scales. In addition, understanding of crop variability, geolocation weather data and precise sensors allow improved automated decision-making and complementary planting techniques.

Robotic farm swarms: The combination of dozens or hundreds of agricultural robots with thousands of microscopic sensors, together would monitor, predict, cultivate and extract crops from the land with practically no human intervention. These implementations are already being carried out at a small scale in the developed economies. Engineering involves technologies that extend the reach of agriculture to new means, new places and new areas of the economy. Of particular interest will be synthetic biology, which allows efficiently reprogramming unicellular life to make fuels, byproducts accessible from organic chemistry and smart devices.

Closed ecological systems: Ecosystems that do not rely on matter exchange outside the system. These, closed ecosystems would

theoretically transform waste products into oxygen, food and water in order to support life-forms inhabiting the system. The use of closed ecological systems is still limited due to the current technological limitations.

Synthetic biology: Synthetic biology is the programming biology using standardized parts as one programs computers using standardized libraries today. It includes the broad redefinition and expansion of biotechnology, with the ultimate goals of being able to design, build and remediate engineered biological systems that process information, manipulate chemicals, fabricate materials and structures, produce energy, provide food, and maintain and enhance human health and our environment.

The vertical farms is a natural extension of urban agriculture, vertical farms would cultivate plant or animal life within dedicated or mixed-use skyscrapers in urban settings. Vertical farms could augment natural light using energy-efficient lighting. The advantages are numerous, including year-round crop production, protection from weather, support urban food autonomy and reduced transport costs.

The writer is a scientist / Maize Breeder with KALRO and also WEMA country coordinator

Grain Storage Silos



- Decrease in grain spoilage, due to moisture control
- Increased grain storage time
- Reduction in insect infestation potential

Silos are used in the storage of bulk materials in various industries, such as agriculture, mining and construction, among other industries. In agriculture, silos are used in the storage of grains, such as maize and wheat, and silage. Reasons for storing these commodities range from capturing higher prices to food security. As such, during the storage period, it is paramount that the quality of the commodity is preserved and loss of commodity, due to spoilage, is prevented. The moisture content and temperature of the stored grain affects the rate of mold growth, rate of grain deterioration and insect activity.

Aeration in silos

Aeration in silos cools the grains, thereby reducing moisture migration and condensation potential near the top of

the grain pile. In addition, the allowable storage time for the grain increases with reduction in grain temperature. Aeration also reduces the insect infestation potential. Insect reproduction is inhibited at temperatures below about 15°C; they become dormant below about 10°C; and they can be killed by extended exposure to temperature below about -1°C.

In conventional, aeration process is highly dependent on prevailing climatic conditions, since ambient air from cool night and morning times with a relative humidity (RH) $\leq 85\%$ is used. Thus, aeration during rainy seasons and in humid tropical areas is very difficult.

Air dehumidification is the solution. By using a desiccant dehumidifier incorporating cooling coils, the relative humidity within the silo, the grain moisture content and the grain temperature can be controlled, ensuring that the grain is stored for longer periods with maintained quality, irrespective of the prevailing weather conditions.

Condensation

If the dew point of the aeration air is kept below the surface temperature of a cool grain, there will be no condensation, thus, no increase in the moisture content of the grain

Mold

Mold and fungus formation is prevented if the aeration air is kept below 70% RH

Dry Air Storage

- Avoid bacteria
- Prevent mould and fungus formation
- No corrosion

Dry air storage

Dry air storages are used for a variety of materials: pharmaceuticals, food products, art, electronic equipment and for national defence equipment. Hygroscopic material is attracting moisture, which often creates favourable conditions for bacteria and mould. By keeping the relative humidity (RH) below 50% in the space bacteria growth and mould can be prevented. With a controlled humidity also condensation and corrosion can be prevented.

Air dehumidification is the solution

By using a desiccant dehumidifier, the relative humidity level within the storage area can be controlled and the products can be stored for longer periods with maintained quality. Additionally, using a desiccant dehumidifier is far more economical than heating and ventilating large storage areas. Read more at www.dst-sg.com and find your closest technical representatives for assistance.

Condensation

If the dew point of the air is kept below the surface temperature of a cold surface, for example a cold water pipe, there will be no condensation.

Mould

Mould and fungus formation is prevented if the surrounding air is kept below 70%RH.





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MICROSTAR PZ^{NG} is a micro-granulated compound fertilizer containing a balanced proportion of Nitrogen, phosphorous, Sulfur and Zinc.



Composition

Element (Form)	Nitrogen (N)	Phosphorous (P ₂ O ₅)	Sulfur (SO ₂)	Magnesium (MgO)	Zinc (Zn)
Percentage	12%	43%	11%	2%	0.7%

Application Rate

Application Rate: 25Kg/Ha

Nurseries: 50 - 100 g/M²

Benefits of Microstar Fertilizer compared to Traditional fertilizers

- Nutrition starter effect and enhances root development and high yields in all crops.
- Low rate of use (10kg/Acre) which makes it less bulky.
- Uniform micro-granules (0.5 to 1 mm) provide a better surface exchange and multiply the contacts with the seed and/or the young plant.
- Fast disintegration capacity and contain water soluble phosphorous.
- Very high CU (coefficient of use) of almost 100%.
- More added elements which include Zinc, Magnesium and Sulfur.



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CIMMYT

Shows Partners in Kenya New Breakthroughs in Maize and Wheat Research

Members of the International Maize Improvement Consortium (IMIC) and other partners had a chance to go on a field visit to the Kiboko and Naivasha research stations in Kenya on September 18 and 19, 2018. The International Maize and Wheat Improvement Center (CIMMYT) and the Kenya Agriculture & Livestock Research Organization (KALRO) held their annual partner field days to share the latest developments in maize and wheat research.

By Jérôme Bossuet



The director of KALRO's Food Crops Research Institute, Joyce Malinga (left), the director of CIMMYT Global Maize Program, B.M. Prasanna (center), and CIMMYT's Regional Representative, Stephen Mugo, open the maize seed cold room in Kiboko (Photo: Joshua Masinde/CIMMYT)

On the first day, CIMMYT invited IMIC researchers to evaluate Material Under Development at the Kiboko site. These maize lines are not publicly released yet but are available to IMIC partners, so they can select the most promising ones for their research and crop improvement work.

Each seed company was looking for certain traits to develop new hybrid varieties. For instance, Samit Fayek, from Fine Seeds Egypt was looking

for ‘erect type’ maize, as he wants higher crop density and grains that look big. Christopher Vollbrecht, from Lake Agriculture in South Africa, was looking for “cobs that stick out as this is what farmers want.” Josephine Okot, from Victoria Seeds in Uganda, said that “seed companies often look at drought tolerance only, but we need now to integrate resistance to Maize Lethal Necrosis.”

Next on the tour to Kiboko, partners visited various stress-tolerant breeding materials, sustainable intensification cropping demonstrations and the Doubled Haploid facility. Vijaya Chaikam, Maize Doubled Haploid Scientist, explained how CIMMYT uses this methodology to cut down breeding time from six to two cycles, which drastically reduces costs.

According to B.M. Prasanna, director of CIMMYT’s Global Maize Program and the CGIAR Research Program MAIZE, doubled haploid breeding is possibly the biggest innovation to speed up genetic gain since the inception of hybrid technology a century ago. “In the next 4 or 5 years, CIMMYT aims at 80 percent use of double haploid lines for new hybrid development; breeding will be faster and much cheaper that way,” Prasanna said. “For now, breeders and seed companies need to know how to use double haploid lines to cost-efficiently crossbreed with their varieties for high-quality hybrids.”

At the end of the visit to Kiboko, CIMMYT officially opened a new maize seed storage cold room. This facility will serve to keep seeds in good condition and to better manage inventory. At the opening were the director of KALRO’s Food Crops Research Institute, Joyce Malinga, CIMMYT’s Africa Regional Representative, Stephen Mugo, and CIMMYT’s Technical Lead for the Global Maize Program, Aparna Das.

Fighting Maize Lethal Necrosis and rust in Naivasha

On the second day, partners visited the

Naivasha research station. There, CIMMYT presented the latest efforts to contain Maize Lethal Necrosis (MLN), a devastating maize viral disease first reported in Kenya in 2011 which caused severe crop losses across Eastern Africa, causing severe crop losses. The Naivasha research station is home to a world-class facility to screen for Maize Lethal Necrosis, jointly managed by CIMMYT and KALRO.

At the facility, maize lines are evaluated for MLN resistance. The best lines and varieties are nominated for further development and shared with partners. National Agriculture Research partners can request MLN screening at no cost, while private seed companies are charged for the service. In the last four years, more than 150,000 germplasm have been screened.

CIMMYT wheat scientist Mandeep Randhawa explained how to recognize the different types of wheat rust diseases: stem, stripe and leaf rusts. He emphasized the Ug99 black stem rust strain, which appeared in Uganda in 1998 and has since severely

impacted wheat production in the region and globally. Randhawa explained how CIMMYT develops varieties resistant to stem rust using a phenotyping platform and marker-assisted selection.

These two field days were a great opportunity to showcase progress in developing more resilient maize varieties in a fast and cost-effective way. This responsiveness is crucial as pests and diseases continue to threaten the livelihoods of African smallholders. Such impact could not happen without the strong collaboration between CIMMYT and KALRO.

The Doubled Haploid Facility in Kiboko and the Maize Lethal Necrosis screening facility in Naivasha were opened in 2013 with support from the Bill & Melinda Gates Foundation and the Syngenta Foundation.

The International Maize Improvement Consortium (IMIC) is a public-private partnership initiative launched in May 2018 as part of CIMMYT’s mission to ramp up seed breeding and production innovations.



A worker at the Naivasha MLN research station conducts a mock inoculation (Photo: Joshua Masinde/CIMMYT)

Climate Change

A changing climate together with unsustainable management of ecosystems is likely to impact both people and nature.

Climate change is one of the most important topics in the world today. The very existence of life on earth is in jeopardy due to increase in global warming. This has largely been the result of anthropogenic interference with the natural systems of the planet. It has come to the point that scientist are now calling this the Anthropocene (human) Epoch because we have, irrevocably in some cases, altered nature by causing mass extinctions, polluting oceans and damaging the atmosphere. The last one is the primary cause of global climate change.

A changing climate together with unsustainable management of ecosystems is likely to impact both people and nature. These impacts can be environmental (degradation, conversion, effects of increasingly frequent and severe events such as floods and droughts, and ecological changes), social (loss of adaptive capacities, knowledge and institutions; inability to manage for the scale and scope of changes; and loss of livelihood options and resilience), or economic (globalization, trade, markets). In addition, the crisis is likely to impact different groups differently.

Natural disasters also tend to worsen the conditions faced by different groups especially the vulnerable and marginalized. Over the past decade or so, various natural disasters have manifested around the globe and these have included extensive and intensive floods, extreme weather phenomenon, droughts, fires etc. And just last week this has led a group of scientists to move the Doomsday Clock 30 seconds closer to midnight – the symbolic point of humanity's annihilation based on the probability of global catastrophe.

The Clock might very well be symbolic but the catastrophes it points to are very real. In the



Drought is also a major concern and an example of what the country can face as seen in South Africa. On January 15, 2018,

last week of January, the River Seine in Paris peaked to about 4 meters above its normal level for the time of year, due to weeks of excessive rainfall. Paris suffered from floods, with around 1500 people evacuated from their homes and almost the same number of homes without electricity. Railway lines have been out of service and expressways abutting the Seine have been closed. This happened in a major city in a developed country. We do not need to stretch our imagination to consider what would (and has) happened in countries like Pakistan.

While a considerable part of Pakistan has been affected by devastating floods and continues to be threatened by them, they are not the only problem we can face. Drought is also a major concern and an example of what the country can face as seen in South Africa. On January 15, 2018, it was reported that 3 years of unprecedented drought has resulted in Cape Town having less than 90 days of water in its reservoirs. This means that Cape Town is well on its way to be the first country in the world to run out of water. It was reported that city authorities have taken the decision to turn off municipal water supplies for all but essential

services, such as hospitals, once dams reach 13.5% of capacity. On January 26, residents were told to turn off toilet taps and to shower only twice a week to avoid the supply being cut off.

Pakistan has experienced droughts before but now their intensity is likely to increase. Even though it has many glaciers and river systems, two thirds of the country is in the semi-arid and arid zone, characterized with low rainfall. This, together with melting glaciers, drying rivers and unsustainable water management and harvesting practices means that many cities – such as Karachi – are likely to face the same fate as Cape Town. In Karachi, the situation is already reaching drastic levels.

Water is already a scarce and precious commodity, not only for the poor but also for the affluent. Water mafias are the new gangs that rule the city, and while the better off sections of society can purchase water, those dependent on municipal supplies are perhaps already doing what the government of Cape Town is asking its citizens to do.

In 1951 per capita water availability – as per the Water and Power Development Authority (Wapda) was 5,650 cubic meters. In 2010, this figure had shrunk to 1,000 cubic meters and is expected to fall to 800 cubic meters in 2025 (that's just seven years from now), when the country's population increases to 221 million. It is reported that groundwater levels are already falling by a meter a year.

This growing water deficit is fast pushing Pakistan towards water poverty in the coming decades – a severe challenge for the government and policy makers. Without a sustainable and holistic water strategy and effective policy making a lot more cities and towns in the country will suffer the same fate as Cape Town. Perhaps even worse.

KBL Pledges to Source 100% of Raw Materials Locally for its New Kisumu Plant

Kenya Breweries Limited (KBL), a subsidiary of Diageo Plc has announced that it will source 100% of its raw materials at its new Kisumu plant locally by 2020. According to the KBL Supply Chain Director Patrick Kamugi, the move was part of EABL's Western and Nyanza raw material sourcing plan.

The company has rolled out the 'West to West' backward integration programme aimed at having majority of the raw materials and the Kisumu brewery sourced from the Western part of the country, that is Nyanza and Western. This will be made possible through an aggressive campaign run by EABL's subsidiary East African Maltings Limited to recruit local farmers.

Since the plant needs an annual incremental of 10,000 tonnes of sorghum to feed its 1 million hectoliters capacity over a period of five years, KBL has already secured 30,000 acres of farming land and has provided farmers with 80 tonnes of seeds and advisory support as part of this commitment.

In collaboration with Alliance for a Green

Revolution in Africa (AGRA) and Kenya Agriculture and Livestock Research Organisation, the brewer is teaching farmers to grow white sorghum and high yielding varieties adaptable to various regions. Also, the company said remains conscious to maintain a 60 -70% local workforce at the manufacturing site. The plant the potential to provide 15,000 farmers with sorghum market to boost the region's agriculture while creating thousands of direct and indirect jobs.

Bumper harvest expected Sorghum farmers in the region are expecting a good harvest following efforts made by KBL to sponsor over 15,000 farmers to grow sorghum for the new plant. Speaking on the matter, Chairman the Homa Bay County Sorghum Farmers Association, Mr Ager Kiroho said farmers in the region were expecting a good income from the brewer. According to him, each farmer has harvested between 30 and 70 bags of millet, making the season's harvest to be the highest in sorghum growing history in the region.

Efforts by KBL to boost this sector included providing 20 threshing machines to farmers

as a way to increase production volumes ahead of the grant opening of the facility. In addition, KBL will also distribute 400 grain drying sheets to first-time sorghum farmers. "We expect to recruit more farmers in the coming months and even though the process had poised some problems such as bad weather at the start, there is hope farmers will harvest up to 15,000 tonnes of sorghum this season," said KBL Supply Chain Director Patrick Kamugi. Among other strategies include a benchmarking field trip event organized by KBL that saw 50 farmers from three counties trained on building crop production capacity.

Address Dangers Posed By Farm Chemicals

The Kenyan Ministry of Agriculture has been cagey on the matter of deleterious use of pesticides.

It is now apparent that the danger we are facing seems bigger than the Ministry can handle, and thus its the loud silence for it seemingly does not want to promise what it cannot afford.

All the same, the Ministry should not run away from the problem, leaving Kenyans exposed.

We need to see the Ministry comment on the matter and candidly tell us of what tests on foodstuffs it has carried out, what the findings were, whether that is likely to be representative of the whole, what discourse it had with selected farmers, which foodstuffs carry the highest chemical impurities, which pesticides have been recently barred from sale in Kenya and any other stories that will make the consumption of the contents on the plate more enjoyable.



Visionary African Leadership Needed For Agriculture Transformation



Landmark Moment for African Agriculture as Rwanda is Announced Host of the African Green Revolution Forum (AGRF) 2018.

Kigali, Rwanda, 7 May 2018 – Africa’s agricultural sector and food systems must rapidly and sustainably transform to deliver incomes, food security, nutrition, and wider economic opportunities if the continent is to achieve middle income status by 2050.

Experience and evidence shows that achieving food security targets and huge returns on agribusiness requires leaders that are visionary, accountable and that integrate efforts by diverse

stakeholders including farmers, local and global private sector, civil society, investors, and development partners. The leadership must also be prepared for regular and rigorous progress assessments.

This call was made at the official announcement of Rwanda as this year’s host of the annual 2018 African Green Revolution Forum (AGRF 2018) to be held later in the year, 3-7 September. The unveiling event was held at the state-of-the-art Kigali Convention Centre where the September Forum will be convened.

Rwanda was selected to host the Forum due, in large part, to its leadership role in agriculture, both at home and across the continent. For example, in January 2018, at the AU Summit, the country was recognized by the African Union Commission as the top performing nation on the

continent in the pursuit of agricultural goals and targets.

Organized under the leadership of H.E. President Paul Kagame and the theme of “Lead. Measure. Grow: Enabling new pathways to turn smallholders into sustainable agribusinesses”, the AGRF 2018 will build on the momentum in Africa’s agricultural transformation in recent years. It will also ensure that this is a marquee moment for both Rwanda and the continent to further advance inclusive agricultural transformation at the heart of the continent’s broader economic transformation agenda and Agenda 2063.

“Agriculture is the economic mainstay of the majority of households in Rwanda and makes a significant contribution to our country’s economy. The sector accounts for approximately 30 per cent of the GDP and employs about 69 per cent of the labor force. Our agriculture is run by smallholder farmers who feed us, provide exports and grow our economy,” said Dr. Gérardine Mukeshimana, Minister of Agriculture and Animal Resources, Rwanda.

“We are delighted to host this year’s AGRF to learn from compelling evidence across the continent for further action. Rwanda is ready to share lessons with other countries as well as gain new insights from its neighbours. We must continue to do even better at understanding new advances and deploying new solutions that will enable us all to tap into the full potential of our continent,

increase value addition, create employment for our youth and nurture viable agribusinesses,” added Minister Mukeshimana. Now in its 7th edition, the AGRF is considered the world’s most important and impactful forum for African agriculture. It pulls together stakeholders in the agricultural landscape to take practical actions and share lessons that will move African agriculture forward.

In just the past two years, the Forum has seen major continental commitments on agriculture. The AGRF 2016 in Kenya, for example, resulted in commitments of more than US \$30 billion dollars to support the continent with investments to increase production, income, and employment for smallholder farmers and local African agriculture businesses over the next ten years. The 2017 edition in Cote d’Ivoire, on the other hand, saw close to US \$6.5 billion worth of business deals in palm oil, pulses, potato, and rice by the private sector.

The 2018 Forum will look at how Africa can meet its development goals by tapping into the full potential of its smallholder farmers and the agribusiness sector. This is because for all the signs of progress in recent years, the continent still needs to move from food shortage to surplus, drive beneficial continental trade, and create millions of jobs and opportunities, particularly for women and youth.

The Forum will advance this agenda with several concrete outcomes in terms of knowledge sharing, the



Leaders from different countries who attended the conference

announcement of new political commitments to agriculture by several governments, new programs and investments, and progress in unlocking billions of dollars in private investment and finance from the private sector.

Speaking at the launch event in Kigali, Mr. Strive Masiyiwa, the Chairman and CEO of Econet Wireless, as well as Chair of the AGRF Partners’ Group, reinforced the comments by the minister, noting that, “Business and progress as usual is not enough for our aspirations as a continent; we must do more and do it more successfully. By scaling the right policies, programs, and investments, governments and partners in the African agricultural landscape can now transform the lives of millions of smallholder farmers and put a good number of countries on the path to a sustainable agricultural transformation, with significant impacts on farmers’ food security, nutrition and improving their bottom line and incomes.”

“Given our theme and focus on the importance of evidence-based leadership in driving progress, we could not ask for a better host for the AGRF 2018 than the Government of Rwanda. With inspirational leadership that measures and tracks the progress we all want to see, we can chart and advance the journey to Africa’s future and prosperity. We look forward to working together to ensure this is a transformative moment for Rwanda and the continent,” said Mr. Masiyiwa.

The 2018 Forum will attract close to 2,000 delegates from across the continent and the world. These will include high-level dignitaries, including current and former Heads of State and Government; Agriculture and Finance Ministers; eminent leaders of global development institutions; top industry captains from the national, regional, and global private sector; and lead representatives of farmer organizations and key non-governmental implementing partners.

Is Kenya's Food Security a Mirage?

An analysis of Kenya's 2018/2019 budget in relation to food security

Experts say the government has not allocated enough resources for the 2018/2019 of food security and nutrition.

New report released yesterday on the 2018/2019 budget analysis stated that Kenya's quest to become food secure will remain a mirage unless urgent and deliberate reforms are implemented. This is despite the agriculture sector receiving sh.1.45 billion more this financial year compared to the last budget.

In the budget, food security and agriculture received a total of sh. 18.8 billion which has been increased to sh.20.25 billion in the 2018/2019 budget.

While presenting the budget on June 14, National Treasury Cabinet Secretary Henry Rotich said the government is planning to grow enough food to feed its people at affordable prices.

"Achieving this will require enhancing large-scale production by placing an additional 700,000 acres of land through public-private-partnership and by promoting investments in post-harvest handling. The government will also adopt contract farming and other commercial off-taking arrangements, including supporting the development of agro parks or hubs to serve as a link to farmers and markets," he noted.

Rotich allocated a total of Ksh8.5 billion for ongoing irrigation projects in order to reduce the vulnerability to drought and bring additional land under crop production. The ongoing irrigation projects are in Bura and Mwea while the National expanded irrigation programme and smallholder irrigation programmes are in Galana Kulalu Turkana and micro irrigation in Schools.

The 2018/2019 budgetary allocation for fertilizer subsidy has been slashed by Ksh. 700 million. In the last 2017/2018 financial year, the government allocated Ksh. 5 billion but this has been reduced to Ksh. 3 billion. "On subsidized fertilizer, I expect the ministry of agriculture to reform the supply chain systems and ensure better service to farmers with the ongoing registration of farmers," he emphasized.

Chief Administration Officer in the agriculture and irrigation ministry Andrew Tuimur confirmed that the ministry will next commence the recruitment of enumerators to be engaged in the farmers registration exercise.

The budgetary allocation in some sub-sectors has increased significantly. They

include the irrigation sector, which has been allocated Ksh. 8.5 billion, which is Ksh. 1.2 billion more compared to Ksh. 7.3 billion for the last national budget. The strategic Food reserve has also received more this financial year at Ksh. 1.4 billion compared to Ksh. 1.3 billion in the last budget.

The crop insurance sector which has been allocated Ksh. 700 million in the 2017/2018 financial year has now received Ksh. 300 million. Mechanization of agriculture received Ksh.100 million and this has increased to Ksh. 500 million.

The national treasury allocated Ksh. 300 million for the armyworm mitigation and Ksh. 1.9 billion for the Kenya Cereal enhancement. Rotich said Ksh. 460 billion has been allocated to the Big Four Sector



drives and their enabling sectors.

“ To support specific incentives under the Special Economic Zones Act and other special incentives, the government will provide the enabling infrastructure including building industrial sheds. To this end, I have allocated ksh. 400 million for the leather industrial park Ksh. 23million development and 4000 million for textile development” said Rotich.

He also allocated Ksh. 1.4billion and Ksh. 200million to modernize facilities in RIVATEX and the new KCC respectively.

The government will further promote investments in post-harvest handling as well a adopting contract farming and other commercial off-taking arrangements, including supporting the development of agro hubs to serve as a link to farmers and markets.

Rotich explained that during last year’s budget speech, he proposed to exempt VAT materials for the construction of grain storage facilities to support safe storage of food and ensure sustainable food security in the country.

“ In the budget, I proposed to expand this exemption to include equipment used in the construction of the facilities in order to lower the cost of post-harvest storage and this will go a long way in supporting the food security pillar under ‘The Big Four’ plan,” Rotich said.



While animal feeds are exempt from VAT the CS said some of the raw materials used in their manufacture are taxable and this treatment has led to high prices of animal feeds.

In order to make animal feeds affordable to farmers and attract more manufacturers to invest in the sector, the CS proposed to exempt the raw materials from VAT .

The CS also set aside Ksh.900 million for crop diversification adding that the severe drought experienced in the country last year underscores the importance of reducing reliance on rain fed agriculture.

Farmers in Uasin Gishu County have however complained that the government is yet to fulfill its pledge of releasing the Ksh. 1 billion owed to farmers for the sale of maize to the national Cereals and produce Board.

NOT ENOUGH

The report commissioned by the Route to Food Initiative, which comprehensively analyzed the 2018/2019 budget from a right to food perspective showed that allocations to the Food and Nutritional security was a paltry 3.54 percent of national government expenditures despite this sector being one of the pillars under the government’s Big 4 priority development agenda.

The route to food initiative is a programme working towards realizing the Right to Food in Kenya which is provided for in Article 43 of the constitution.

In addition, the budget lacked explicit policies, programs and comprehensive fiscal incentives to address the constitutionally guaranteed Human Rights to Food.

“Treasury in its 2018 Budget Statement omitted food and nutrition sector from its assessment of key constraints to economic growth and development. Not only is this ironic as food security has been prioritized in the Big 4, but it also undermines the need for policies and programs aimed at ending systemic hunger and laying the foundation for a meaningful and socially inclusive development path” Alexander Owino, a financial expert and author of the report said .

Additionally, the report faults the Budget statement for its various contradicting proposals which if implemented will disproportionately negatively affect small-scale farmers. Two proposals include the removal of interest rate caps and classification of fuel and oil a VAT exempt, which will in turn raise financing costs for the sector despite Government’s pledge to make affordable credit available.

Given that agriculture is a devolved function, the report advocates for allocation of up to 50 percent of the Ksh. 62.4 billion Conditional Cash Transfers to County Governments to be specifically spent on food and nutritional security programmes.

“This measure alone would increase spending on Food and nutrition sector by an estimated Ksh. 30billion across all levels of government and over the medium term begin to redress the current 3.54 percent allocation,” Owino noted.

Bayer Contributes Majorly to the Government's Big Four Agenda Through Agricultural Innovation

- Bayer- Monsanto buyout beneficial towards agricultural innovation , a great boost to the government's food security agenda.
- Approval of the BG2 cotton seed variety is an important milestone towards in reviving the manufacturing sector and creating jobs for Kenyans.
- Social Investments & community engagement key to Bayer's Operations.

Bayer East Africa has re-affirmed its commitment to the government's big four agenda through their contribution to food security by ensuring innovations in agriculture –by way of employing technology combined with talent to deliver value to both customers and partners.

Speaking during his tour of Kenya, Global Head of Agricultural Affairs and Scientific Affairs Jesus Madrazo emphasized on the company's vision of ensuring that agriculture becomes part of the solution in an environment marred with challenges such as limited resources and the ever-changing climate.

"We are creating leader in agriculture with a broad portfolio, and we pride ourselves in providing superior product offering and tailored solutions for our customers across the world. It is for this reason that Bayer has recently made moves such as the acquisition of Monsanto, which provides us with the more back-up as we work towards providing our customers tailored solutions for their varied needs", said Mr. Madrazo.

To further the food security agenda, Bayer has partnered with WEMA- a public private partnership whose aim is to improve food security and rural livelihoods of smallholder farming in Sub-Saharan Africa.

Through this partnership, Bayer and WEMA have developed maize seed hybrids that not only promise better harvest results but also have insect protection trait. The project which is led by the African Agricultural Technology Foundation (AATF) based in Kenya. The project has received funding from the Bill and Melinda Gates Foundation, the Horward G. Buffett Foundation and USAID, among others. In addition to food security, Bayer is also keen on supporting the government's manufacturing



**Global Head of Agricultural Affairs and Scientific Affairs
Mr. Jesus Madrazo**

agenda.

Recently Bayer has notable milestones towards the commercialization of the Bollgard 2 (BG2) cotton variety; which was approved by the National Bio-safety Authority and other government bodies for National Planting Trials.

"Manufacturing is one of the pillars of development as mapped out by the government. This background, supports our enthusiasm towards the progress we are making with the BG2 cotton seeds variety. The recent approval goes further to champion our vision to revive the textile industry in the country, as well as empower Kenyans through job creation", Said Eric Bureau, Bayer Africa MD.

Bayer East Africa understands the value of giving back to the community around which they operate, and that is why they have endeavoured to invest in projects that are geared towards community upliftment.

"Responsible corporate citizenship is at the core of our operations and that is why we have launched several programs across Africa. One

of the current projects that we have running is the 5 million dollars improved Approach to Community-based Nutrition in Turkana (IMPACT) Project; whose goal is to improve nutrition outcomes for pregnant and lactating women and infants and young children (>5 years of age). Our community development projects across the country cover water and sanitation and farming to name a few", said Mr. Jesus Madrazo.

Another one of Bayer's most recent collaboration is with One Acre Fund where the company injected EUR 700,000 to go towards improving the situation of smallholder farmers in Africa and to provide better nutrition.

The project addresses more than 600,000 farmers in Kenya and Rwanda who are to be provided with high-quality poultry and digital technology. The partnership is a key element in Bayer's strategy to support social innovation and sustainable development in Africa.

Currently, Bayer has a CSR footprint in Kenya, Tanzania, Malawi, Zambia and Nigeria where they work with non- profit organizations.





In Your Seeds I Trust: African Seed Companies Test the Seed Assure Application

More than 20 representatives of eastern and southern African seed companies and regulatory agencies recently took part in the demonstration of a new seed certification application that can help get quality seed to market more quickly and curb sales of counterfeit seed.

As part of an event organized by the International Maize and Wheat Improvement Program (CIMMYT) at the Kiboko research station of the Kenya Agricultural & Livestock Research Organization (KALRO) on September 17, 2018, participants field-tested a beta version of SeedAssure, a digital platform that gives automatic feedback on compliance and seed production management, along with remedy options.

SeedAssure was developed by Cellsoft, a supply chain management software company, with input from the Alliance for a Green Revolution in Africa (AGRA), the Qualibasic Seed Company, the Kenya Plant Health Inspectorate Service (KEPHIS) and CIMMYT. "This is very useful for companies like ours, spread as we are over different countries, to manage at a distance our seed growers," said Andy Watt of QualiBasic Seed Company, who has been testing SeedAssure on the company's farms. "The application's dashboard will point out which farms to visit quickly for corrections."

Mobile innovations enhance quality and speed

For over a decade, the region's seed sector has sought fast, cost-effective and transparent seed quality control and certification approaches for use across the value chain and the region. Seed companies often rely on under-staffed national certification agencies that may miss critical inspections or give inaccurate reports. Registration of new varieties can take many years, discouraging investment in improved seed and impeding regional trade.

Worse, by some estimates as much as 40 percent of the seed sold in eastern and southern Africa is falsely labelled or not what farmers are told they are buying. KEPHIS recently confiscated over 13 tons of "fake" seeds. The seed sector has sought mobile innovations such as tablet-based field inspections whose data load to centralized, cloud-based dashboards.

With SeedAssure's "traffic light" system, field inspection results for factors such as plant population will score green (complied – good quality), amber (needs improvement) or red (reject) and be readily visible to key actors in the seed certification and supply chain, according to David Laurence-Brown, SeedAssure co-developer.

"This quality assurance system can help seed companies get licenses faster, speeding product to market and greatly reducing the financial risk of getting new varieties to farmers," said Laurence-Brown. "The vision is that all actors have access to timely and accurate data on products, licensing and trade movements, with quality control checks along the value chain."

He said that SeedAssure features 260 critical questions in 13 seed production checklists. "Putting the right questions in the right order is crucial to determine how sustainable your seed production is," Laurence-Brown explained.

Fixing the Bugs

Participants emphasized that national and regional regulatory bodies needed to be on board. "Advocacy has to be done at different levels, from COMESA, national plant protection organizations, big and small seed companies, and research institutes and donors," said Kinyua Mbijewe, a co-creator of SeedAssure, adding that this has been underway for a year now with a positive response, and public engagement is now ramping up with partners like AGRA and USAID.

Participants also suggested simplifying SeedAssure by reducing the number of questions and the subjectivity of certain data fields. For example, they observed that a more objective method was needed for scoring pest infestations, rather than SeedAssure's current approach of rating infestations as low, moderate or intense via visual estimation. "This will not be adopted if it's too complex," said Nicolai Rodeyns, NASECO seed company, Uganda.

CIMMYT announced that it would offer members of the International Maize Improvement Consortium (IMIC) a one-year trial subscription to SeedAssure.

Finally, AFSTA, AGRA, CIMMYT, COMESA, USAID, and other partners are forming a SeedAssure Alliance to support testing and rollout with companies and public organizations in eastern and southern Africa.



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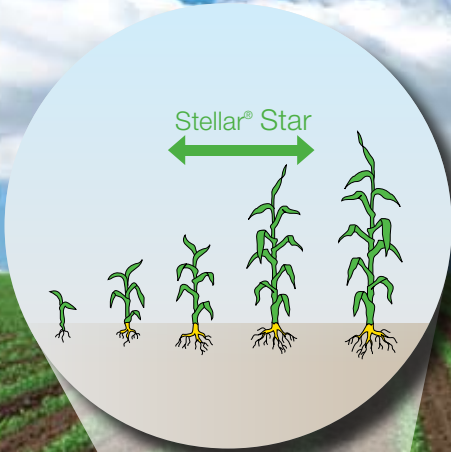
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