

CEREALS

July - September 2023

Ksh.400 Tsh. 6,900 S.A Rands 50 USD 3

The leading journal for field crops



A single stone for Two Birds...

TARZEC™ 320 WG

Arylex™ active

HERBICIDE

Post – Emergence Herbicide for the control of Grasses & Broad leaf weeds on Wheat

Active Ingredient:

Arylex™ active 69.5 g/Kg & Pyroxsulam 250g/Kg

Application Rate:

90g/ha, 9 g/20l

PHI: 71 Days





Editorial **3**

Features

Galana Kulalu **4**

Kenya plans to expand the Galana Kulalu Food Project after a successful first 500-acre trial crop.

Make Data Pay **6**

Maximize the human environment by putting your brain to work and making things happen.

Key to Reducing High Cost **9**

The cost of living has gone up quite tremendously and the hope of a better future is diminishing each day.

First Budget Under Ruto **16**

It aims to raise agricultural productivity and reduce reliance on imports for food security.

Biological Control for Aflatoxin **20**

Biological control strategies offer sustainable and environmentally friendly approaches to combat aflatoxin contamination.

Enhancing Crop Health **22**

To ensure optimal wheat yields and quality, farmers must adopt effective agricultural practices, including the use of appropriate fertilizers.

Good Farm Manager **28**

Farm managers who prioritize growth in knowledge, experience and collaboration are best positioned

Science of Weather **30**

Weather forecasting is complex and challenging. The process entails three steps: observation, analysis and communication.

Leaving No One Behind **34**

By investing in agricultural research, technology, infrastructure, and practices, can enhance food production capacity

Potential of Sorghum **38**

Latest developments in sorghum research, innovation, challenges and sustainable practices in the face of climate change

Herbicide Resistance **42**

Herbicide resistance in cereal crops is primarily a consequence of natural selection





Bram Govaerts

Renowned scientist and leader, has been appointed as CIMMYT's Director General for the period 2023-2028 as of July 1, 2023, after holding the position on an interim basis for two years and steering the organization through the unprecedented global challenges of the pandemic and ongoing food insecurity. Under Govaerts' leadership, CIMMYT has expanded its research portfolio and strengthened its work in key regions. Govaerts has also started an effort to streamline internal processes and operations to speed up CIMMYT's response capacity and impact across the world.

Cereals

July-September
2023

Editor

MASILA KANYINGI

Sub-Editor

MARY MWENDE MBITHI

Editorial Assistant

CORNELIUS MUEKE

Contributors

VICTOR ONGOMA

TIMOTHY NJAGI

DAVID OCHIENG

XN IRAKI

ODONGO KODONGO

ELGON KENYA LTD

STAK

CIMMYT

JENNA HOFFMAN

MARION ALUOCH

HRAC

Photographer

ALEXANDER MAINGA

Graphics Designer

EVELYNE NDIEMA

Marketing

FLORINEWS LTD

ADMINISTRATION ASSISTANT

Christine Muthoki

Editorial Board

NICHOLUS MBATHA - CORTEVA

JOSEPH KIOKO

MAINA NGUNJU- BAYER EAST AFRICA

MARTIN MWOBODIA - CONSULTANT

STAY CONNECTED TO CEREALS

TEL: 020-2440908 ,0732-558172,

EMAIL: info@cereals.co.ke

Website: www.cereals.co.ke



Power of Self-Reflection

Empathy, communication, adaptability, emotional intelligence, compassion; these are all skills you need to thrive in the workplace and become a great leader. Time and again, we even hear that these capabilities are the key to making yourself indispensable — not just now but far into the future. Even so, one competency that is often less talked about is reflection. Research shows the habit of reflection can separate extraordinary professionals from mediocre ones. We would go so far as to argue that it's the foundation that all other soft skills grow from. The practice itself is all about learning, looking back on the day (without bias or regret) to contemplate your behavior and its consequences. It requires sitting with yourself, taking an honest moment to think about what transpired, what worked, what didn't, what can be done, and what can't. Reflection requires courage. It's thoughtful and deliberate. Being at the "top of your game" only comes when you extract from your past how to engage the future.

So, what should you reflect upon? *The Cereals Magazine* has reflected the last five years and is ready to give you a fresh look. Hope you enjoy!

Masila Kanyingi
Editor



State to expand Galana Kulalu food project after a successful trial

Kenya plans to expand the Galana Kulalu Food Project after a successful first 500-acre trial crop. President William Ruto in a tweet said the trial was a “great success” adding that there are plans to expand to 20,000 acres next year and progressively to 200,000 acres in four years.

“The first 500-acre trial crop in Galana is a great success. Next year, with the private sector, we will expand to 20,000 acres and progressively to 200,000 acres in four years,” said President Ruto in the tweet.

President Ruto noted that this is part of the country’s food security plan to eliminate hunger. “This is part of our food security plan to eliminate the shame of hunger from our motherland. Forward always,” says part of his tweet. The president stopped a planned subdivision of Galana Kulalu land into settlement parcels

and ordered the revival of the Galana Kulalu irrigation project in January, which began with maize production in February.

“I direct Private Sector and GOK (the National Irrigation Authority) under a Public–Private Partnership (PPP) to work on the ready 10,000 acres to produce food starting with maize in February,” he said at the time.

The government on April 13 had said they would soon start commercial use of idle land in the country.

Principal Secretary, State Department for Crops, Kello Harsama, said there are huge chunks of land that have been lying idle for many years.

“We have been having a serious shortage of maize in the country and in order to seal this gap, one of the options which has been realised is to ensure that we utilise these huge tracts of land owned by these organisations,” Harsama said.

The Sh7.5 Billion Galana Kulalu Food Security Project which covers 1.75 million acres of land was begun by the government seven years ago but would later stall.

The project began in what the Jubilee government said was aimed at improving food production in the country. The government used more than 1.2 million acres of land belonging to the Agricultural Development Corporation for the project through irrigation.

In 2021 the government invited the private sector to become partners in the project, saying that the move was aimed at using their efficiency in the agricultural sector.

Decades and depths of research Kenya has invested to develop GMO crops.



Zantara®

NEW PRODUCT ALERT

Protect the Powerhouse of your crop from **Stem Rust and Yellow Rust**

Recommended as a T2 spray

Application rate: 1 – 1.25 litres per hectare or 100 – 125 ml in 20 litres of water.



With Zantara®

Without Zantara®

For more information, read the label and contact a Bayer Representative near you

Nakuru: Martin Irungu 0724 355 527 • **Narok:** William Masikonde 0715 407 493 • **Eldoret:** Phylis Kosgei 0724 355 848
Meru: Peter Kiburih • **Maralal:** Paul Chege

For more information register to the Bayer SMS service, dial *205# or send your enquiry for free to 22143

7 Ways to Make Data Pay



“If you can’t afford to tile a whole field, tile the areas that need drainage the most.”

According to the old saying, some people make things happen; others watch what happens; and still others wonder what happened. It pays, literally — to be in the first group.

That cliché brings us into the Sustainable Triangle: Once you’ve maximized the physical environment (the seed furrow) and the natural environment (weather), it’s time to maximize the human environment by putting your brain to work and making things happen.

How to do that? It’s great to learn what happened after harvest, and plan to fix problems next year. But it’s even better to spot issues in time to improve this year’s crop.

Here’s how to get the biggest ROI from your layers of data:

1. Separate annual and perennial problems.

Annual problems are tied to this season and might not reoccur, such as herbicide drift. Perennial problems occur multiple years in the same spot. Those are the kind you identify by looking at multiple years of data.

2. Use data from day one.

One of the great benefits of auto-steer is that you can not only watch your equipment but also monitor your as-applied maps for irregularities. For example, you may spot down-pressure issues or discover you’re placing seed into dry soil. You can raise yield and ROI by fixing such problems on the front end of the season.

3. Don’t let up midseason.

Studying aerial images during the growing season may reveal developing problems such

as disease, insects, herbicide drift or a missing sidedress pass in time to fix them. Viewing that data after the season can tell us when the problem occurred but not necessarily what caused it.

4. After harvest, put on your CSI hat.

After harvest, put on your CSI hat. With your crop in the bin, it’s time to discover the secrets of your fields by studying every layer of data. Start with your final layer of data, the yield map. When you find areas of low yield, work back through the layers, all the way back to the as-applied maps you made at planting time, until you find the cause.

5. Treat low-yielding areas as individual zone

When a problem shows up year after year, determine whether it occurs in every crop or only in soybeans or corn, and in wet, dry or normal seasons. Does it match up with maps of soil type, topography or electro-conductivity? Record the problem areas you identify so you can manage around their individual weaknesses.

6. Some zones might need more research.

About 90% of the time, layers of data will reveal the cause of low yield. But if no answer emerges, ground-truth the area next growing season. Take soil, tissue and parasite tests. Dig down and study root systems for compaction or insect feeding.

7. Many perennial yield problems are caused by water.

It might be too much or too little.



NEW, SAFE & EFFECTIVE BIO-BASED SOLUTION TO CONTROL FALL ARMY WORM



100% bio-based solution

Compatible with IPM Program

Highly efficacious

High level of control when used at the right stage

Highly Specific

Targeted for Fall Armyworm and does not harm the beneficial insects

Dose : 100 mL/ha

2-3 applications, 1 week interval



Farming, the Key to reducing High cost of living

The idle lands must now be put to good use so as to boost food security and reduce reliance on foreign aid.



Kenyans are a worried lot, and it is understandably so. The cost of living has gone up quite tremendously and the hope of a better future is diminishing each day.

The difference between what one could buy with Sh1,000 in a supermarket five years ago and what you can purchase with the same amount of money right now is insanely huge.

The lower-class households are especially badly hit by the ever soaring cost of living. With the prices of basic commodities hitting the roof, and continuing to increase each day, many families are living in destitution and are not in a position to afford three meals per day. A majority cannot even afford to put

food on the table.

The middle class has not been spared either. The rising costs have forced them to find ways to adjust to the new harsh realities. I watched recently on a local television news channel how Kenyans have concocted new ways to cope with the current economic situation. Reduction in the expenditure on social life and luxury was more prominent.

This is attributed to the steep slump in disposable income in many households. The sharp fall in disposable income among

To Page 10

From Page 9

Kenyan households is attributed to a number of global factors, including the war in Ukraine, which has disrupted supply chains across the world igniting a spike in prices of commodities. It will be a tough year financially for many ordinary citizens as costs blow out for non-discretionary items.

Unfortunately, the cost of living crunch is predicted to slow Kenya's economic growth, as household consumption growth is set to significantly plummet this year. Kenyans are frustrated by rising costs, yes. But they are also frustrated by how much more attention they must pay to these rising costs.

Latest statistics indicate that inflation in the country edged down to 7.9 per cent in the month of June, following May's eight per cent. June's figure represented the weakest inflation rate since May 2022, but was slightly above market expectations. The result was driven by moderating price pressures for housing and utilities and transportation.

This is quite encouraging as it is a sign that the economy is gradually easing up for Kenyans. The government has made a solemn commitment to ensure that the cost of living does not bludgeon Kenyans to death.

President William Ruto's commitment to this course is never in doubt. He truly understands the situation on the ground and has placed his best foot forward. It may take time before government instituted short and long-term interventions are seen to bear any fruit, but we are hopeful it will certainly do.

Even as he genuinely tackles the economic situation in the country, the President has received his unfair share of blame as far as the present state of affairs of our economy is concerned. The people are justified in pointing fingers at their leadership, but it is equally important to understand that the rain did not start pounding us today or yesterday.

For us to reach this stage, it has been years of economic mismanagement dipped in the abyss of maleficence, unmitigated borrowing and negligence. Certainly, it isn't

possible to ameliorate the effects of years of rot by the stroke of a pen.

That is why the Kenya Kwanza administration's economic recovery intervention strategies that the government has clearly outlined to Kenyans should be supported for they are geared towards mitigating the mess we are in. It needs bold steps to be taken.

Most of them may appear unpopular, but they have to be implemented for they hold the key to unlocking a better and prosperous future.

It also means that as a country we must have a paradigm shift and stop over reliance on food imports. This is our achilles heel. It is a pity that we have abandoned farming and depend on foreign countries to feed us. Back in the village, swathes of land lie idle. Farming has greatly reduced while in some places owners of such parcels of land have completely abandoned farming.

It also means that as a country we must have a paradigm shift and stop over reliance on food imports. This is our achilles heel. It is a pity that we have abandoned farming and depend on foreign countries to feed us. Back in the village, swathes of land lie idle. Farming has greatly reduced while in some places owners of such parcels of land have completely abandoned farming.

The net effect is that we have low supplies of food items in the market thus pushing prices of basic commodities above the reach of many Kenyans. Reducing the cost of living is, therefore, not an exclusive role of the government. We must play our part by going back to farming. The idle lands must now be put to good use so that as a country we can be food sufficient to reduce reliance on foreign aid and donations.

That means taking advantage of the government subsidised fertiliser and encouraging the youth to relish farming. A lot more will also need to be done to make farm inputs not only affordable but also accessible to farmers. The untapped opportunities lie in the agricultural sector, which has been deliberately ignored by millennials and Generation Z who prefer dancing on Tik Tok to soaking their feet in mud.



PATRIOT 750WDG

LANDMINE 550SC

Toa Nutgrass kwenye Mahindi



LANDMINE 550SC

*Mesotrione + Altrazine
for control of grasses and broad
leaf weeds .*

PATRIOT 750WDG

*Halosulfuron methyl
for the control of nut grass.*



Bestfield East Africa Limited
Saku business park. North Airport Road.
P.O.Box 51369 - 00200 City square, Nairobi Kenya.
Tel: +254 704380212
Email: info@bestfield.co.ke | www.bestfield.co.ke



A single stone for Two Birds, Agrivoltaics is the way to go...

The captured solar energy is converted into electricity, which can be used on-site to power farm operations, or it can be fed into the grid, offsetting the need for fossil fuel-based power generation.

Agrivoltaics, also known as solar sharing or agrophotovoltaics, is a sustainable approach that combines agriculture and solar energy production. It involves the coexistence of solar photovoltaic (PV) systems and agricultural activities on the same land. By harnessing solar energy while utilizing the same land for farming, Agrivoltaics offers several benefits, such as increased land productivity, energy generation, and environmental sustainability.

Key aspects and advantages of Agrivoltaics

- **Land Use Efficiency:** Agrivoltaics maximizes land utilization by allowing farmers to grow crops or raise livestock underneath elevated solar panels. This way, the land serves a dual purpose, increasing overall land productivity. The solar panels provide shade, reducing evaporation and improving water retention in the soil, which can be particularly beneficial in dry regions.
 - **Crop Yields and Quality:** Agrivoltaics can positively influence crop growth by providing shade, reducing temperature extremes, and minimizing water stress. The panels can act as a barrier against harsh weather conditions, protecting crops from wind, hail, and excessive rainfall. Additionally, certain crops can benefit from the filtered sunlight, resulting in improved yield, quality, and reduced water requirements.
 - **Renewable Energy Generation:** By installing solar panels on agricultural lands, Agrivoltaics contributes to renewable energy production. The captured solar energy is converted into electricity, which can be used on-site to power farm
- operations, or it can be fed into the grid, offsetting the need for fossil fuel-based power generation.
 - **Economic Viability:** Agrivoltaics presents a potential revenue stream for farmers by diversifying their income sources. They can generate electricity sales or reduce their own energy costs while continuing traditional farming practices. This dual-use system can help offset the initial investment in solar panels and potentially increase the overall profitability of the land.
 - **Environmental Benefits:** By combining agriculture and solar energy, Agrivoltaics promotes environmental sustainability. It reduces greenhouse gas emissions by displacing fossil fuel-based electricity generation. Additionally, it helps preserve agricultural land and ecosystems by avoiding the conversion of farmland into solar farms or reducing the need to clear natural habitats for energy projects.
 - **Research and Innovation:** Agrivoltaics is an evolving field that continues to generate

To Page 14



From Page 13

The solar panels provide shade, reducing evaporation and improving water retention in the soil, which can be particularly beneficial in dry regions.

research and technological advancements. Researchers are studying the optimal panel height, crop selection, water management techniques, and system design to maximize the benefits and compatibility of solar energy and agriculture.

Classification of Agrivoltaics

Agrivoltaics can be classified based on various factors and approaches.

Here are a few common classifications:

1. System Configuration

- **Fixed Mounting:** In this configuration, solar panels are installed in a fixed position, and agricultural activities take place underneath or around the panels. The orientation and tilt angle of the panels are determined based on solar energy optimization.

• **Tracking Systems:**

Some agrivoltaic systems incorporate solar panel tracking mechanisms that allow the panels to follow the sun's movement throughout the day. This maximizes solar energy capture while ensuring proper shading and lighting conditions for crops.

2. Crop Selection

- **Annual Crops:** Agrivoltaic systems that focus on annual crops involve cultivating crops that have shorter growing seasons, such as vegetables, grains, or legumes.

These crops are typically planted and harvested within a single growing season.

- **Perennial Crops:** Certain agrivoltaic systems integrate perennial crops, which have longer life cycles and can be harvested multiple times over several years. Examples include orchard trees, vineyards, or berry bushes.

Agrivoltaics promotes environmental sustainability. It reduces greenhouse gas emissions by displacing fossil fuel-based electricity generation. Additionally, it helps preserve agricultural land and ecosystems by avoiding the conversion of farmland into solar farms or reducing the need to clear natural habitats for energy projects.

3. Panel Height and Arrangement

- **Low-Height Systems:** These systems involve solar panels mounted at relatively low heights, typically a few meters above the ground. This allows for easier access to crops, maintenance of the panels, and a closer microclimate interaction between the panels and crops.

- **High-Height Systems:** In high-height systems, solar panels are mounted at greater heights, often several meters above the ground. This

configuration provides more space for taller crops to grow underneath, such as sunflowers or certain varieties of corn.

4. Water Management

- **Surface Irrigation:** Agrivoltaic systems that rely on surface irrigation methods involve the use of conventional irrigation techniques, such as flood irrigation or furrow irrigation. Water is distributed across the land surface to nourish crops and



maintain soil moisture levels.

- **Drip Irrigation:** Some agrivoltaic systems incorporate drip irrigation, which delivers water directly to the plant roots using a network of tubes or emitters. This method can help conserve water and reduce weed growth.

5. Research Focus:

- **Productivity Optimization:** Some agrivoltaic systems are designed with a primary focus on maximizing crop productivity. Researchers study factors like light intensity, spectral composition, shading patterns, and microclimate modifications to enhance crop yields.

- **Resource-Efficient Systems:** These agrivoltaic systems aim to minimize resource consumption, such as water usage, by integrating efficient irrigation techniques and employing crop selection that requires fewer inputs while maintaining adequate productivity.

It's important to note that Agrivoltaics is a dynamic field, and the classifications provided above are not exhaustive. Ongoing research and innovation continue to refine and expand the understanding and implementation of agrivoltaic systems.

This article continues in the next issue.

Three experts review Ruto's first Budget

What's the government doing to address the budget deficit?

Odongo Kodongo: Last year, Ruto instructed Kenya's Ministry of Finance to slash KSh300 billion (about US\$2.5 billion at the time) from the government's spending for the 2022/23 fiscal year. That's a cut of about 9% of the Ksh3.286 trillion that the treasury had expected to spend.

This cut would be a step towards reducing the country's budget deficit – the difference between government's spending and its income. The deficit was projected at KSh849.2 billion (or 5% of GDP) for the 2022/23 fiscal year.

When the budget deficit is high, it means that more of the government's planned expenditures must be financed by debt. This causes the amount of public debt to increase. However, at about 5.7% of GDP, Kenya's budget deficit is comparable to that of South Africa and the US. It's about the same, too, as the average levels recently observed in most low-income countries.

It's not clear whether the government has achieved the budget cut. The minister has said that emergencies and pressing issues such as drought and curriculum changes have required spending.

Ruto's administration criticises the former administration but continues to borrow just like it did. It recently adjusted the debt ceiling again, replacing the existing ceiling of KSh10 trillion with a "floating" ceiling of 55% of GDP. This means the government will change its debt annually depending on the country's economic output. There's no real political will to rein in spending. The drive to do so was part of the International Monetary Fund's conditions for funding.

What does the budget mean for the agricultural sector?

Timothy Njagi: Ruto's administration has tried to keep some of the election promises made. The budget proposals are consistent with some of these.

First, the government committed to enhancing access and reducing the costs of inputs – mainly through fertiliser subsidies. The government reintroduced the subsidy that offered fertiliser at 50% of the market price.

My take is that the subsidy is justified, but doing it through the National Cereals and Produce Board is a poor choice for the model of delivery. The model, where the government procures fertiliser and farmers collect it from the nearest cereal board depot, does not enhance access as distribution is concentrated in areas with high maize growing potential. The distance from farming households to the nearest depot is far, and the transport costs reduce the cost saving.

Second, the government committed to reducing the cost of food. It aims to raise agricultural productivity and reduce reliance on imports for food security. Although the government has waived import duties and the finance bill proposes to reduce some levies (import declaration levy and railway development levy), the measures have been countered by a rising exchange rate and high global food prices.

Success in raising agricultural productivity depends to a great extent on the performance of county governments. While county governments have allocated better proportions of their budget to the agricultural sector (6%) compared to the national government (2%), they have to invest in extension

Success in raising agricultural productivity depends to a great extent on the performance of county governments. While county governments have allocated better proportions of their budget to the agricultural sector (6%) compared to the national government (2%), they have to invest in extension services.



XN Iraki



Odongo Kodongo



Timothy Njagi

services. The commitment to finance the agricultural sector was quite low (KSh250 billion over five years) in view of challenges such as lack of extension services and climate-related shocks.

Third, the Finance Bill has some measures that will benefit agro-processing industries. The removal of annual inflation adjustments to the excise duty will create a predictable environment. Excise duty on imported food is intended to protect local producers, but it must be accompanied by investments to make them more competitive.

Imposing export levies on raw primary products is an incentive to local value addition and this could potentially create employment. There are some concerns about tax changes that could raise the cost of production for farmers in the short term. There is also a need for consistency in the value added tax policy as it has kept changing since 2013.

Does the budget deliver Ruto's promise to transform the manufacturing sector?

XN Iraki: Manufacturing contributed only 7.8% of GDP in 2022. This is well below many African countries, including Uganda, Ghana, Nigeria and Eswatini. To support manufacturing, the Kenyan budget outlines a number of investments, incentives and taxation measures. Top of these, in my view, is the revival of Kenya Industrial Estates – a state agency established to promote micro and small scale industries.

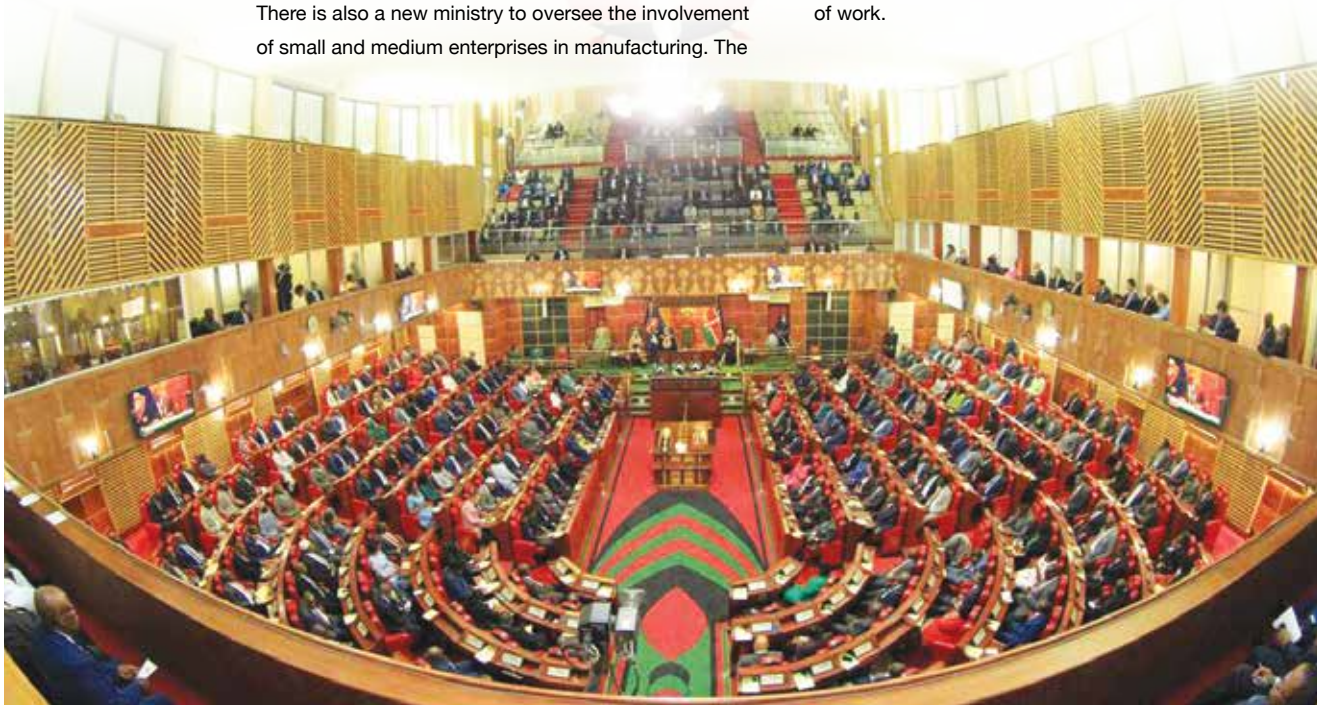
There is also a new ministry to oversee the involvement of small and medium enterprises in manufacturing. The

budget includes plans to establish a small and micro enterprise development centre in every ward, as well as an industrial park and business incubation centre in every technical and vocational education and training institution. Funding for research and development will rise from 0.8% in the next fiscal year to 1% of GDP after three years but this is low compared with, say, Israel, which put 4.8% of its GDP into research and development in 2022. Israel is a leader in innovation, more so in agriculture.

The budget policy statement says there will be more investment in technical and vocational training. The government also intends to halt the conversion of polytechnics into universities so the country can produce more graduates with technical skills. This is reinforced by training and professional development opportunities for manufacturing workers.

The budget policy seeks to give manufacturers incentives to invest in employee training. It proposes extension of the African Growth and Opportunity Act beyond 2025 and offers tax incentives for exporters. Ruto also intends to support agro-processing and value addition to agricultural exports. This is a good step in a country where almost a quarter of the GDP comes from agriculture.

The budget is a good start but it has to be implemented. Manufacturing was a priority sector for Mwai Kibaki's and Uhuru Kenyatta's administrations. The targeted 20% contribution of manufacturing to GDP needs a lot of work.



A New Dawn for Kenyan Farmers as Fertilizer Prices Drop Further



H.E. William Ruto:
President of the Republic of Kenya

Government appealed to farmers to redouble the use of fertilizer per acre to increase agricultural production.

Recently, President William Ruto announced a further drop in fertilizer prices from the existing Ksh 3,500 to Ksh 2,500 per bag as part of the government's interventions to lower the price of food in the country. At this price, we expect a significantly higher uptake of fertilizer. Since fertilizer is a game-changer in agricultural productivity, this should translate to higher production in the next planting season.

The Head of State noted that the government had embarked on the distribution of fertilizer to farmers throughout the country during the short rains, saying the Government is keen to ensure that around 61 million bags are produced annually between this season to 2027 from the long rain season alone. According to President William Ruto, an estimated yield of 44 million bags is expected, compared to last year's 32 million bags to meet national demand this year.

"For the coming short rains, the government has embarked on the distribution of fertilizer to farmers throughout the country, to ultimately deliver 100,000 MT, or 2 million 50kg bags, at a subsidized cost of Ksh 2,500," he said.

The president also announced the commencement of the second phase of farmer registration. "I also announce today that we are launching the second phase of the nationwide digital farmer registration exercise," he said.

In 2017, Kenya produced 39.6 million bags of maize were produced. In 2018, production rose to 44.6 million bags but later slumped to 39.7 million bags in 2019. In 2021, 40.2 million bags were produced and 43 million bags last year.

The president further promised the farmers driers for their cereals to mitigate post-harvest losses. "As we prepare for a bumper harvest, thanks to a successful collaboration between the government and farmers, I also take this opportunity to convey more good news to farmers. We are implementing a national initiative to acquire 100 driers, which will be distributed strategically to various NCPB depots nationwide, to serve maize farmers at subsidized and highly affordable rates. It is our initial and primary intervention to mitigate post-harvest losses, which usually claim as much as 30 percent of produce harvested, especially with the onset of expected El Nino rains in the October-November-December season." He said.

Further noting the need to eliminate brokers, middlemen, and conmen in the agriculture value chain, the president promised the implementation of the warehouse receipt system Act of 2019. He also promised an increment in the Agriculture Finance Corporation (AFC) budget.

"We shall implement the Warehouse Receipt System Act, 2019, which establishes a structured and well-regulated trading system for agricultural commodities. This system creates an ecosystem with opportunities for the private sector and NCPB to provide a trading platform that links buyers and sellers and facilitates access to credit by agricultural producers. The Warehouse Receipt System also supports the reduction of post-harvest losses and cushions farmers against low farm-gate prices. We are increasing the budget for the Agriculture Finance Corporation (AFC) from Ksh 2 billion to Ksh 10 billion, to facilitate affordable credit available to farmers. The credit will be provided at single-digit rates to further reduce our cost of production and enhance productivity." He said

The Unveiling of Kantaria Centre

the project will contribute towards the country's vision 2030 in terms of food security and improved livelihoods.

The University of Nairobi, in conjunction with Elgon Kenya Ltd, held a groundbreaking ceremony for a multi-million dollar project, which is said to be the first of its kind – Kantaria Agricultural Technology and Innovation Centre (KATIC), at the upper Kabete Campus, Faculty of Agriculture.

The facility will be named after the late philanthropist and chairman of Elgon Kenya Limited, Mr. Rajnikant Kantaria who was interested in projects and programmes whose aim was to uplift people in the society. Thus, upon completion, the center will showcase cutting-edge agricultural technologies, incubate and accelerate the commercialization of research results, provide extension services and facilitate capacity building through mentorship and tailor-made courses.

The Center's overall purpose will be to bridge the gap between industry, academics (research and development), and rural communities. It is hoped that the Centre would provide students, farmers, and other agricultural stakeholders with easy access to knowledge and learning resources, as well as networks and connections. Elgon Kenya, as one of Kenya's leading Agri-input suppliers, provides access to the widest range of Agri-inputs in the country, including agriculture chemicals, fertilizers, seeds, irrigation equipment, plastic and nets, packaging items, veterinary medicines for farm animals, reinforcing its position as the country's leading Agri-input supplier.

The groundbreaking ceremony was presided over by the Prime Cabinet Secretary, Hon. Wycliffe Musalia Mudavadi. Also in attendance were the UoN Chancellor Dr Vijoo Rattansi, the UoN, Vice Chancellor Dr. Stephen Gitahi Kiama, Elgon Kenya's Managing Director, Dr. Bimal Kantaria, French Ambassador to Kenya Arnaud Suquet and India's High Commissioner to Kenya Namgya Khampa among other dignitaries.



He believes that collaboration between industry and academia would move the country towards long-term agricultural growth. He also emphasized the significance of agriculture in the country, noting that it provides a major source of income for 60% of the rural people.

According to Mudavadi, Kenya's population is estimated to hit the 55 million mark by the end of this year and we must invest and improve agricultural production by at least 2% yearly.

Elgon Kenya's Managing Director, Dr. Bimal Kantaria, said that the company will contribute between \$50 and \$60 million towards the project and sought the government and other partners to do the same. "We are concerned about what will happen after the Centre is completed, so we are looking for partners."

According to the University of Nairobi, Vice Chancellor Dr. Stephen Gitahi Kiama, the collaboration is unique in that it is student-centered and concerned with providing solutions to the sector. "Elgon Kenya will provide internships to 25 students." Six students have already been hired by the organization, while others have established their own businesses.

the center is founded on the objective "to provide quality university education and training while embodying the aspirations of the Kenyan people and the global community through knowledge creation, preservation, integration, transmission, and utilization"

Biological Control for Aflatoxin

Harnessing Nature's Defense against a Silent Threat



Aflatoxin contamination is a serious concern in food safety, posing significant risks to human and animal health. Aflatoxins are highly toxic and carcinogenic secondary metabolites produced by certain fungi, primarily *Aspergillus flavus* and *Aspergillus parasiticus*. These fungi can infect a wide range of crops, including corn, peanuts, cottonseed, and tree nuts, leading to the contamination of food and feed products. Conventional methods for controlling aflatoxin contamination often involve the use of chemical interventions, but these approaches come with environmental and health concerns. As a result, there has been growing interest in biological control strategies, which utilize natural mechanisms to mitigate aflatoxin contamination.

Understanding Aflatoxin Contamination

Aflatoxins are produced by fungi during the growth and colonization of crops under specific environmental conditions. Factors such as high temperature, humidity, insect damage, and drought stress can promote the growth of aflatoxin-producing fungi. Once contaminated, aflatoxins are highly stable and resistant to degradation, making them difficult to eliminate from food and feed products. Aflatoxin contamination poses significant economic losses and public health risks, including acute toxicity, chronic effects such as liver cancer, immunosuppression, growth impairment, and reproductive disorders.

Biological Control Mechanisms

Biological control involves the use of living organisms or their by-products to suppress pest populations or reduce toxin levels. Several

mechanisms can be employed for biological control of aflatoxin contamination:

Competitive Exclusion

One effective strategy is the introduction of non-toxicogenic strains of *Aspergillus spp.* into the crop environment. Non-toxicogenic strains outcompete toxicogenic strains for resources and ecological niches, thereby reducing the overall population

of aflatoxin-producing fungi. This approach has shown promise in reducing aflatoxin contamination in crops such as peanuts and corn.

Antagonism and Biological Competition

Certain beneficial microorganisms, such as *Trichoderma* species, have shown antagonistic interactions with aflatoxin-producing fungi. *Trichoderma spp.* release various antimicrobial compounds and enzymes that inhibit the growth and toxin production of *Aspergillus spp.* These biocontrol agents can be

applied as seed treatments or soil amendments to suppress aflatoxin contamination.

Biological Detoxification

Enzymes produced by certain bacteria and fungi can degrade or transform aflatoxins into less toxic compounds. For example, some strains of bacteria, such as *Bacillus* species, and fungi, such as *Aspergillus niger*, produce enzymes that can break down aflatoxins. This biological detoxification mechanism holds potential for reducing the toxicity of aflatoxins in contaminated food and feed products.

Biological control strategies offer sustainable and environmentally friendly approaches to combat aflatoxin contamination. By harnessing nature's defense mechanisms, we can effectively reduce the risks associated with aflatoxin exposure, safeguard human and animal health, and protect the global food supply.



Aflatoxin in maize

Probiotics and Prebiotics

Probiotics, which are beneficial bacteria that promote gut health, have shown promise in reducing aflatoxin absorption and toxicity in humans and animals. Probiotic strains such as *Lactobacillus* and *Bifidobacterium* can bind to aflatoxins in the gastrointestinal tract, preventing their absorption into the bloodstream. Additionally, prebiotics, which are non-digestible food components that stimulate the growth of probiotic bacteria, have been investigated for their potential to enhance aflatoxin detoxification in the gut.

Insect-Mediated Biological Control

Insects play a significant role in the spread and proliferation of aflatoxin-producing fungi. Their feeding activities on crops can provide entry points for fungal infection and contribute to the dispersal of fungal spores. Biological control methods targeting insects can help reduce aflatoxin contamination. For example, the use of *entomopathogenic* fungi, which are harmless to humans and animals but lethal to insects, can effectively manage insect populations and subsequently limit the spread of aflatoxin-producing fungi.

Genetic Approaches for Aflatoxin Control

Advancements in genetic engineering have opened up possibilities for developing crops with enhanced resistance to aflatoxin-producing fungi. Researchers have identified

genes involved in the aflatoxin biosynthetic pathway and successfully introduced genetic modifications to silence or downregulate these genes in crops. This approach, known as host-induced gene silencing, shows promise in reducing aflatoxin levels in susceptible crops.

Biological control strategies offer sustainable and environmentally friendly approaches to combat aflatoxin contamination. By harnessing nature's defense mechanisms, we can effectively reduce the risks associated with aflatoxin exposure, safeguard human and animal health, and protect the global food supply. The integration of various biological control mechanisms, including competitive exclusion, antagonism, biological detoxification, probiotics, prebiotics, insect-mediated control, and genetic engineering, holds great potential in mitigating the silent threat of aflatoxin contamination. Continued research, collaboration, and implementation of these innovative approaches will be crucial in ensuring food safety and improving the quality of life for populations worldwide.

Enhancing Crop Health and Productivity: Importance of Foliar Feeds in Wheat Farming in Kenya

Foliar feeding allows targeted delivery of nutrients, bypassing potential soil nutrient limitations or imbalances. As a result, plants can access the required nutrients directly, increasing their efficiency of nutrient utilization. This approach reduces nutrient wastage and ensures that plants receive an adequate supply

feeding allows targeted delivery of nutrients, bypassing potential soil nutrient limitations or imbalances. As a result, plants can access the required nutrients directly, increasing their efficiency of nutrient utilization. This approach reduces nutrient wastage and ensures that plants receive an adequate supply of nutrients during critical growth stages.

Wheat is a crucial crop in Kenya, playing a vital role in food security and economic growth. As one of the staple cereals, it is widely cultivated across the country, providing a source of income for farmers and a primary food source for the population. To ensure optimal wheat yields and quality, farmers must adopt effective agricultural practices, including the use of appropriate fertilizers and nutrients. Among these practices, foliar feeding has gained recognition as a valuable technique for enhancing crop health and productivity.

Understanding Foliar Feeding

Foliar feeding refers to the application of liquid fertilizers or nutrient solutions directly to the leaves of plants. Unlike traditional soil-based fertilization, foliar feeding enables the direct absorption of essential nutrients through the plant's stomata, resulting in rapid nutrient uptake and utilization. This method provides an effective means of correcting nutrient deficiencies, promoting healthy growth, and improving crop performance.

Benefits of Foliar Feeding in Wheat Farming:

1. Improved Nutrient Efficiency: Foliar

2. Rapid Nutrient Absorption: Wheat plants absorb nutrients more efficiently through their leaves compared to root uptake. By applying foliar feeds, farmers can provide an immediate nutrient boost to crops, addressing deficiencies promptly. This rapid nutrient absorption enhances plant growth, vigor, and overall health, resulting in improved yield potential.

3. Enhanced Stress Tolerance: Wheat crops are susceptible to various environmental stresses, including drought, heat, and disease pressures. Foliar feeding helps plants withstand these challenges by providing readily available nutrients that support their stress tolerance mechanisms. Essential nutrients, such as nitrogen, potassium, and micronutrients, promote plant resilience, enabling wheat plants to withstand adverse conditions and maintain productivity.

4. Correcting Micronutrient Deficiencies: Micronutrient deficiencies can severely limit wheat productivity, leading to reduced yields and poor grain quality. Foliar feeding offers an effective method for correcting these deficiencies promptly. Essential micronutrients like iron, zinc, and manganese can be easily supplied through

By applying foliar feeds, farmers can provide an immediate nutrient boost to crops, addressing deficiencies promptly. This rapid nutrient absorption enhances plant growth, vigor, and overall health, resulting in improved yield potential.

foliar applications, ensuring optimum nutrient levels and preventing yield losses caused by deficiency-related disorders.

5. Increased Grain Quality: Foliar feeding has been linked to improvements in wheat grain quality. Balanced nutrient supply during critical growth stages enhances protein content, gluten formation, and overall grain size. This translates to higher-quality wheat, which commands better market value and contributes to improved farmer incomes.

Foliar Feeding Strategies for Wheat Farming in Kenya:

1. Timing and Frequency: Timing and frequency of foliar feeding are critical for maximizing its benefits. It is essential to apply foliar feeds during key growth stages, such as tillering, stem elongation, and heading. This ensures that plants receive the necessary nutrients when they are most needed. Additionally, multiple applications throughout the growing season may be required, especially in cases of severe nutrient deficiencies or during periods of stress.

2. Nutrient Selection: The choice of nutrients for foliar feeding should be based on soil analysis, plant tissue testing, and specific crop requirements. Nitrogen, phosphorus, potassium, and micronutrients like iron, zinc, and manganese are commonly used in wheat foliar feeds. However, the nutrient composition and concentration may vary depending on the crop's nutritional status and growth stage. Consulting with agricultural extension services or agronomists can help farmers make informed decisions regarding nutrient selection.

To Page 24



From Page 23

3. Adjuvants and Compatibility: Adjuvants are substances added to foliar sprays to enhance nutrient absorption and adhesion to leaf surfaces. They improve the effectiveness of foliar feeds by ensuring better coverage and penetration of nutrients into the plant tissues. It is crucial to select appropriate adjuvants and ensure their compatibility with the chosen nutrient solutions. Conducting compatibility tests prior to large-scale applications can help prevent adverse effects on crops.

4. Application Techniques: Proper application techniques are vital for achieving optimum results with foliar feeding. It is essential to use high-quality spraying equipment that delivers a fine spray mist to cover the leaf surfaces evenly. Spraying should be done during calm weather conditions to minimize drift and ensure maximum contact between the foliar spray and the plants. Additionally, spraying should be timed to avoid high-temperature periods, as excessive heat can cause leaf burn.

5. Integrated Approach: Foliar feeding should be viewed as a complementary

practice within an integrated crop management system. It is not a substitute for proper soil fertility management or balanced fertilization. Soil testing, organic matter incorporation, and judicious use of basal fertilizers remain essential for overall crop health and long-term soil sustainability. Integrating foliar feeding with these practices can optimize nutrient availability and maximize wheat productivity.

Foliar feeding offers significant advantages in wheat farming in Kenya. Through targeted nutrient delivery, this technique enhances nutrient efficiency, promotes rapid absorption, improves stress tolerance, corrects micronutrient deficiencies, and increases grain quality. To harness the benefits of foliar feeding effectively, farmers need to adopt appropriate strategies regarding timing, nutrient selection, adjuvants, application techniques, and integration within a holistic crop management approach. By incorporating foliar feeds into their farming practices, Kenyan wheat farmers can optimize yields, improve profitability, and contribute to the nation's food security goals.



The New Seed Trade Association Of Kenya (STAK) Board



Wasike Wellingtone
Chairman
He is the MD at AgriSeedCo



Duncan Onduu
Honorary Secretary
He is the Executive Officer at STAK



Anthony Kioko
Board Member
He is the CEO at Cereal Growers Association



Tony Gathungu
Board Member
He is the Global Head of Seeds 2B at Syngenta Foundation



Andy Watt
Vice Chairman
He is the MD at Quali Basic Seed



Dianah Orinda
Board Member
She is the Head of Seeds at Amiran Kenya



Lynette Ngila
Board Member
She is the Director at Dryland Seed



Betty Kiplagat
Board Member
She is the Government and Industry Affairs Lead - AME at Corteva Agriscience



Amardeep Jandu
Treasurer
He is the Director at Kenya Highland Seed



Francis Kathimba
Board Member
He is the Director at Continental Seed



Robert Musyoki
Board Member
He is the Director at KALRO Seeds



Sammy Chepsiror
Board Member
He is the Ag MD at Kenya Seed Company



Mrs Samina Esmail
Board Member
She is the Director at Kenya Highland Seed

STAK is pleased to announce the appointment of new Board Members. The members were duly elected during the Association's Annual General Meeting (AGM) held this year on 24th May. During the election, STAK welcomed a new Chairman, Mr Wellingtone Wasike, who is the Managing Director of Agri SeedCo. Joining our esteemed Board include Betty Kiplagat, Mrs. Samina Esmail and Sammy Chepsiror.

Please join us in welcoming the board members who bring a wealth of expertise and experience in the seed industry and are keen to drive the association to greater heights.

Farmers' priorities are our priorities

New CIMMYT research sheds light on farmer maize preferences in Ethiopia and western Kenya.

By Alison Doody

Cimmyt

Figuring out what

kinds of crops and crop varieties farmers want

– high yielding, disease resistant, drought tolerant, early maturing, consumer-preferred, nutritious etc. – is

a crucial step

in developing

locally adapted, farmer-friendly and market preferred varieties as part of more sustainable seed grain sectors.

While scientists aim to develop the best crop varieties with multiple traits, there are always trade-offs to be made due to the limits of genetics or competing preferences. For example, a variety may be more tolerant to drought but perform less well in consumer taste preferences such as sweet grains, or it may be higher yielding but more vulnerable to pests and diseases. Some of these trade-offs, such as vulnerability to pests or adverse climate, are not acceptable and must be overcome by crop scientists. The bundle of traits a crop variety offers is often a major consideration for farmers and can be the difference between a bumper harvest and a harvest lost to pests and diseases or extreme weather conditions.

Economists from the International Maize and Wheat Improvement Center (CIMMYT) have been working with smallholder farmers across sub-Saharan Africa to document their preferences when it comes to maize. Results from Ethiopia were recently

published in the journal PLOS ONE.

In a survey with almost 1,500 participants in more than 800 households, researchers found that both male and female farmers valued drought tolerance over other traits. For many farmers in areas where

high-yielding, medium-maturing hybrids were available, early maturity was not considered a priority, and sometimes even disliked, as farmers felt it made their harvests more vulnerable to theft or increased their social obligations to share the early crop with relatives and neighbors if they were the only ones harvesting

an early maize crop. Farmers therefore preferred varieties which matured more in sync with other farmers.

The team also found some gender differences, with female farmers often preferring taste over other traits, while male farmers were more likely to prioritize plant architecture traits like closed tip and shorter plants that do not easily break in the wind or bend over to the ground. These differences, if confirmed by ongoing and further research, suggest that gender differences in maize variety choices may occur due to differentiated roles of men and women in the maize value chains. Any differences observed should be traced to such roles where these are distinctly and socially differentiated. In aspects where men and women's roles are similar. For example, when women express preferences in their role as farmers as opposed to being custodians of household nutrition, they will prioritize similar aspects of maize varieties.

The results of the study show that overall, the most important traits for farmers in Ethiopia, in addition to those that improve yields, are varieties that are drought and disease tolerant, while in taste-sensitive markets with strong commercial opportunities in green maize selling, farmers may

The bundle of traits a crop variety offers is often a major consideration for farmers and can be the difference between a bumper harvest and a harvest lost to pests and diseases or extreme weather conditions.

By taking farmers' preferences on board, maize scientists can help develop more sustainable maize cropping systems which are adapted to the local environment and respond to global climatic and economic changes driven by farmers' and consumers' priorities.

prioritize varieties that satisfy these specific consumer tastes. The findings of the study also highlight the impact of the local social environment on variety choices.

By taking farmers' preferences on board, maize scientists can help develop more sustainable maize cropping systems which are adapted to the local environment and respond to global climatic and economic changes driven by farmers' and consumers' priorities.

Drought and striga tolerance come out top for Kenyan farmers

In related research from western Kenya, published in June 2022 in *Frontiers in Sustainable Food Systems*, results showed that farmers highly valued tolerance to drought, as well as tolerance to striga weed, low nitrogen soils and fall armyworm, in that order. CIMMYT researchers surveyed 1,400 smallholder farmers across three districts in western Kenya.

The scientists called for a more nuanced approach to seed markets, where seed prices might reflect the attributes of varieties. Doing so, they argue, would allow farmers to decide whether to pay price premiums for specific seed products thereby

achieving greater market segmentation based on relative values of new traits.

“Both studies show that farmers, scientists and development experts in the maize sector are grappling with a wide array of demands,” said Paswel Marenya, CIMMYT senior scientist and first author of both studies.

“Fortunately, the maize breeding systems in CIMMYT, CGIAR and National Agricultural Research Systems (NARS) have produced a wide range of locally adapted, stress tolerant and consumer preferred varieties.”

The results of both these studies provide a framework for the kinds of traits scientists should prioritize in maize improvement programs at least in similar regions as those studied here in central Ethiopia or western Kenya. However, as Marenya noted, there is still work to do in supporting farmers to make informed choices: “The challenge is to implement rigorous market targeting strategies that sort and organize this complex landscape for farmers, thereby reducing the information load, search costs and learning times about new varieties. This will accelerate the speed of adoption and genetic gains on farmers' fields as envisaged in this project.”



What Makes a Good Farm Manager?

There are three areas producers need to focus on to earn the title of “good farm manager,” according to Purdue University researchers. (Lindsey Pound)

By Jenna Hoffman

Managing a farming operation is a balancing act on all levels. The role of farm manager can become more complex when working with family, especially in the busy seasons.

To make the job easier, researchers at Purdue University find farm managers who prioritize growth in knowledge, experience and collaboration are best positioned to buffer relationships and increase output.

Here is a rundown of how each of the three skills interact with one another for success on the farm.

1. Knowledge: Managing farm risk is a time-consuming job, but it needs to be done. Purdue researchers say the best way to stay up to date in managing risk is through courses, reading and discussion. Putting a focus on learnable risk.

“Learnable risks possess uncertainty because we haven’t learned all there is to know about the subject,” the researchers wrote. “It’s in the best interest of a farm to mitigate learnable risks through accumulation of knowledge as rapidly as possible.”

An understanding of production strategies, technology advancements and ways to reduce inputs are important and often prioritized, but researchers suggest producers focus instead on these specific upstream and downstream ideas:

- Sourcing inputs
- Input price factors
- Potential supply limitations/market disruptions
- Diversifying buyer pool

According to Purdue, knowledge in these areas is a major contributor to holding a key position in the ag industry, and incorporating the knowledge will offer a definite advantage over competitors.

2. Experience: Established producers have advantages over producers who are new to the industry; they have an idea of the time of year to plant, fertilizer, treat and market products. They also have the benefit of lower costs, according to Michael Porter, professor at the Harvard Business School.

Porter says new operations, with no experience, will have inherently higher costs than established farms. New farms will bear heavy startup losses from below- or near-cost pricing to gain the experience and profits that established farms already possess.

For new producers to find success, Purdue says they need to gain experience rapidly and effectively. Researchers suggest new producers gain farm work experience and participate in internships and mentor programs.

3. Collaboration: According to Purdue, there are two types of collaboration that producers need to consider: Peer and competitor. They say this is the only way for progress.

“Learnable risks possess uncertainty because we haven’t learned all there is to know about the subject,” the researchers wrote. “It’s in the best interest of a farm to mitigate learnable risks through accumulation of knowledge as rapidly as possible.”

“There’s a false premise that in order to maintain a competitive advantage in the market, strategies and innovations should not be shared,” Purdue says. “Secrecy is likely not what’s best for your operation, nor the ag industry as a whole.”

To maintain collaboration, researchers suggest producers listen to constructive criticism, such as:

- Critiques from an outside perspective
- Alternative innovation ideas
- Improved strategies

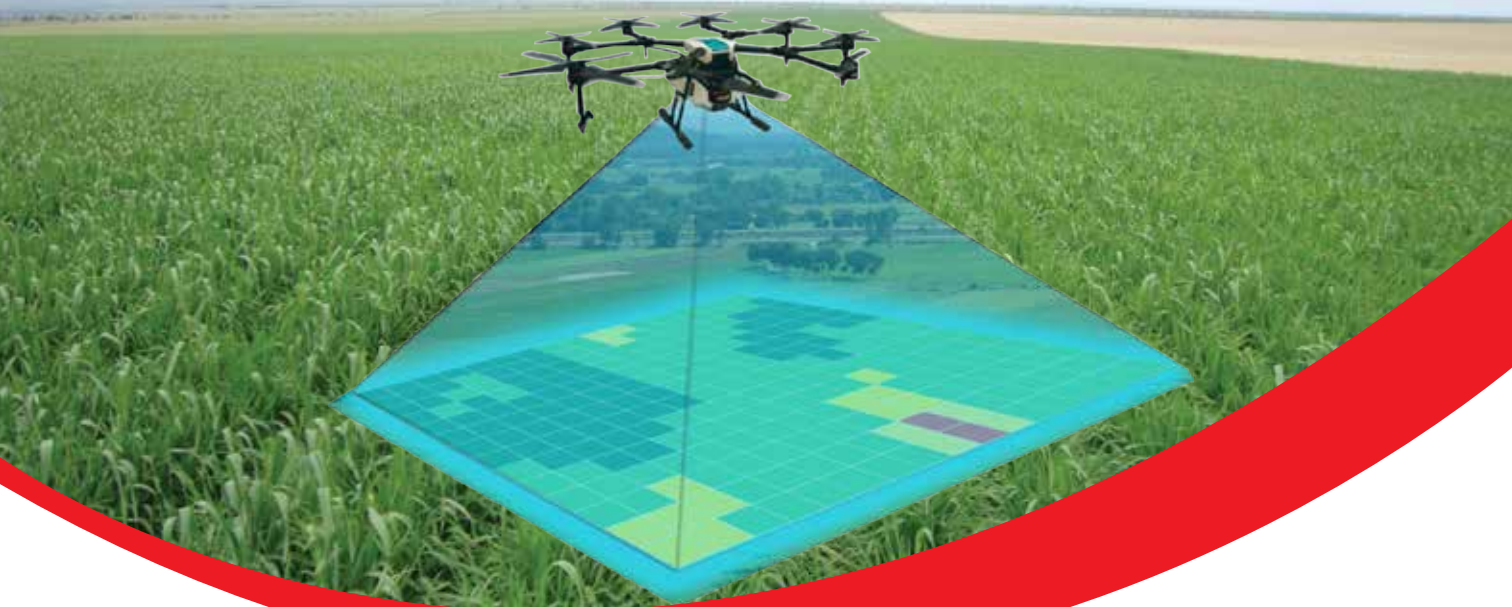
Collaboration and constructive criticism are especially important in ag’s technology arena. Studies indicate technology adoption is dependent on collaboration.

“Farmers with more risk averse tendencies often begin using technologies long after others have switched,” Purdue’s researchers say. “As new technologies continue to emerge, collaboration will increase in importance.”

Researchers find encouraging frequent networking and collaboration can help prevent producers from lagging behind the industry’s set standards and fuel more efficient ag production.

LENTERA PRECISION AGRICULTURE

Technology enabling farmer success



SATELLITE IMAGING



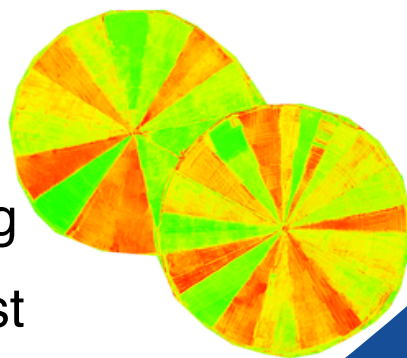
DRONE IMAGING



CONNECTED WEATHER STATION

Get useful insights on your farm:

- Crop health analysis
- Soil moisture analysis
- Aerial pest and disease scouting
- Hyper-localized weather forecast



LENTERA
A F R I C A

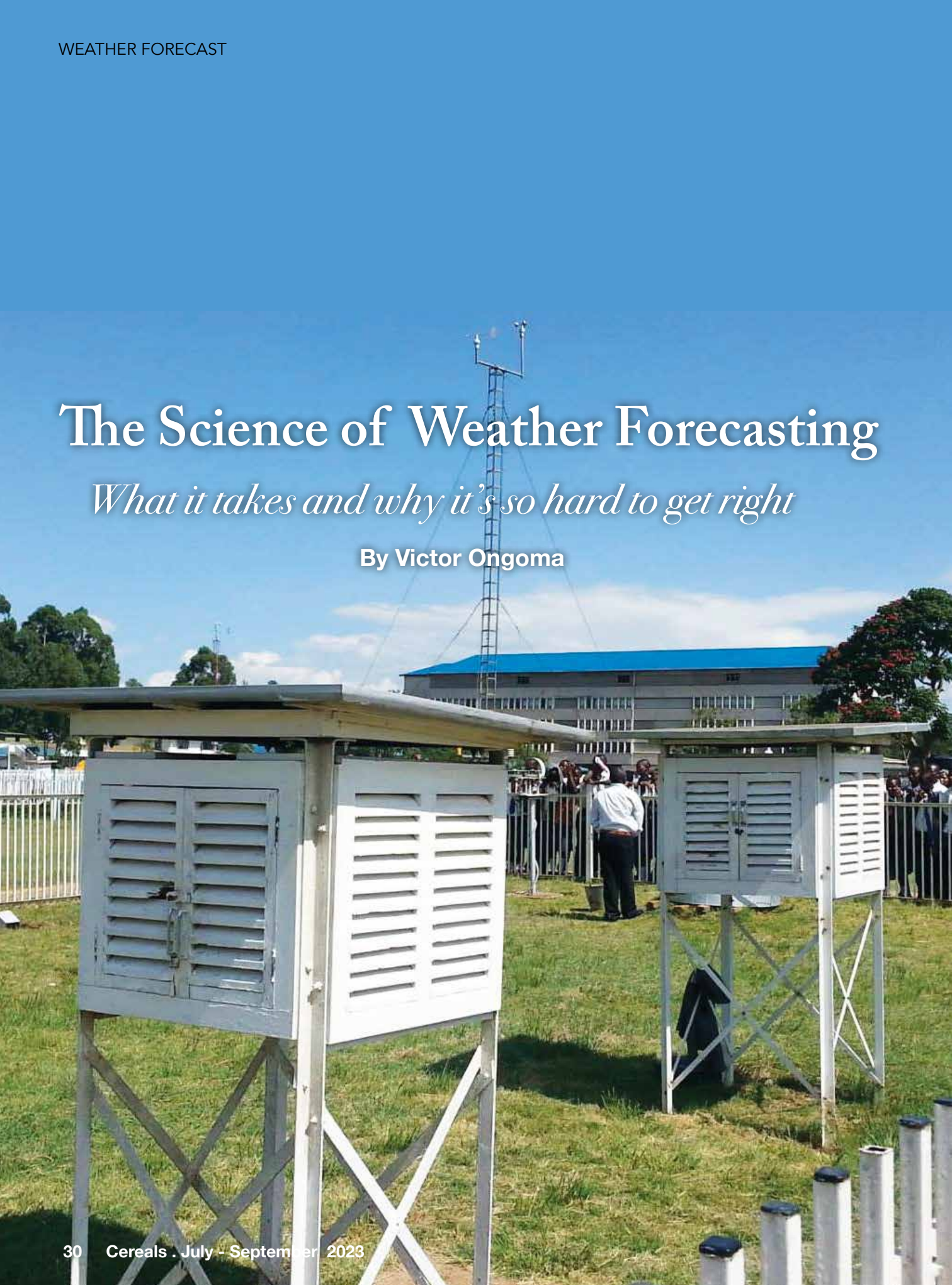
Website: www.lenterafrica.com

Cellphone: +254-743162357

The Science of Weather Forecasting

What it takes and why it's so hard to get right

By Victor Ongoma



“Learnable risks possess uncertainty because we haven’t learned all there is to know about the subject,” the researchers wrote. “It’s in the best interest of a farm to mitigate learnable risks through accumulation of knowledge as rapidly as possible.”

Weather forecasting is an important science. Accurate forecasting can help to save lives and minimise property damage. It’s also crucial for agriculture, allowing farmers to track when it’s best to plant or helping them protect their crops.

And it will only become more vital in the coming years. “Learnable risks possess uncertainty because we haven’t learned all there is to know about the subject,” the researchers wrote. “It’s in the best interest of a farm to mitigate learnable risks through accumulation of knowledge as rapidly as possible.”

I am a meteorologist with specialities in forecasting weather and climate change – who wants to improve the quality of weather products and their applications to spur socioeconomic development across Africa. Doing so matters: the World Bank has pointed out that better weather forecasts can bolster the continent’s development.

So, how does forecasting work? What does it take to produce accurate, reliable and timely forecasts? And how can African countries do better on this front?

A complex process

Weather forecasting is complex and challenging. The process entails three steps: observation, analysis and communication. For observation, forecasters work with atmospheric models. These are sets of equations that depict the state of the atmosphere. The models use information on the initial state (observations) of the

atmosphere, land and ocean to forecast weather. Data from the models is combined with information drawn from weather stations which are set up at key points across a region or country to give the actual state of the atmosphere. This data assimilation produces a better forecast since it optimises forecasters’ understanding of the evolving weather system.

It’s easier to be accurate when giving a short-range forecast – one that covers hours to days – than it is when interpreting long-range (months or seasons) data. The atmospheric system is dynamic; the more time that passes, the less certain forecasters can be of its state.

To Page 32



Victor Ongoma

Weather stations which are set up at key points across a region or country to give the actual state of the atmosphere. This data assimilation produces a better forecast since it optimises forecasters’ understanding of the evolving weather system.

From Page 31

Technological advances have greatly improved the general quality of weather forecasting. For instance, more observations are possible because of automated

weather stations.

There's also been an increase in the use of high performance computing.

This allows for more data storage, faster processing, analysis, and visualisation of incoming data. These datasets are key in diagnosing past and current weather to create a forecast. Unfortunately, the data observation

network (both manual and automated stations) is still poor, especially in developing countries. That's the result of limited investment into the sector. Forecasters in these countries are forced to use alternative datasets that are not very accurate.

One such alternative dataset is Numerical Weather Prediction. It uses global deterministic models that are normally not detailed enough to realistically represent convection at a local or regional level; forecasters using this data often can't accurately predict rainfall, especially heavy rain. A lack of access to better historical

data also means forecasters struggle to identify when an area's seasonal rainfall will start and end because they can't examine trends over years or decades.

Indigenous knowledge is under threat as the elders who are its custodians are perishing. Vital plants and animals used in their processes are going extinct, too. It would be a great pity if this resource were lost to forecasters. This knowledge plays an important role in local livelihoods and it supports efforts to forecast and make sense of seasonal climate state at local scale.

It's these variations in access to data and technology that mean some forecasts are more accurate than others.

Once forecasts have been collated, they are released in various forms. The way that weather products – apps, TV and radio bulletins or website updates – are packaged will differ depending on end users' needs. Some people, like farmers, may be

especially interested in seasonal forecasts and will seek these out. Athletes, for example, are more likely to use portals or services that focus on hourly and daily forecasts.

I would recommend that, whoever you are, you consider seasonal forecasts general information for broad planning purposes. But this should be interpreted together with monthly, weekly and daily forecasts for accuracy's sake.

Indigenous knowledge

Some African countries also use another kind of data for their forecasts: indigenous ecological knowledge. This entails drawing

Private firms that provide global weather forecasts are also emerging. This is commendable given that they supplement the services of countries with limited resources.

It's easier to be accurate when giving a short-range forecast – one that covers hours to days – than it is when interpreting long-range (months or seasons) data. The atmospheric system is dynamic; the more time that passes, the less certain forecasters can be of its state.

from communities' long held knowledge about their environments, and especially about long-term trends and shifts. Such knowledge can be blended with scientific processes during forecasting.

The “rainmakers” from the Nganyi community in western Kenya are a good example. These residents have deep historical knowledge about the area's climate and weather patterns. They use plants and animals to understand what the weather is doing. They now work with meteorologists from Kenya's Meteorological Department to produce seasonal weather forecasts.

Indigenous knowledge is under threat as the elders who are its custodians are perishing. Vital plants and animals used in their processes are going extinct, too. It would be a great pity if this resource were lost to forecasters. This knowledge plays an important role in local livelihoods and it supports efforts to forecast and make sense of seasonal climate state at local scale.

Changes coming

Some of the ways that weather is forecast today may change in the coming years. The World Meteorological Organisation is encouraging national meteorological

services to move from what the weather will be (forecasting weather) to what the weather will do – impact based forecasting-and-warning.

There's also a push to ensure forecasts reach the people who need them. A number of African countries, among them Malawi and Chad, have adopted what's known as Participatory Scenario Planning. This collaborative approach designs and delivers user focused climate information services by taking the co-production process down to the sub-national level. It brings together producers and users of weather and climate information – meteorologists, indigenous knowledge experts, researchers, various sectors of local government, farmers, as well as NGOs and journalists.

Private firms that provide global weather forecasts are also emerging. This is commendable given that they supplement the services of countries with limited resources. But my advice is that, where the national meteorological and hydrological centres have capacity to produce weather forecasts, theirs should be considered first, ahead of those generated by private firms. This is because national bodies' forecasts are based on the observed historical and observed data which they are custodians of rather than private institutions that rely mainly on model data.

Leaving No One Behind



The President of the African Development Bank Group, Akinwumi Adesina, once said, “We cannot build a sustainable world without ending hunger and improving nutrition. Food security is not only a moral imperative, but it is also a fundamental building block for global stability and prosperity.”

Agriculture is the primary source of food production and plays a vital role in ensuring food availability. Productive and sustainable agricultural systems are crucial for meeting the growing food demands of a growing population. By investing in agricultural research, technology, infrastructure, and practices, countries can enhance their food production capacity and contribute to food and nutrition security. Additionally, promoting diversified and nutritious crops and fostering sustainable livestock and fisheries production can improve the quality and nutritional value of available food, addressing the issue of malnutrition.

Agriculture employs a significant portion of the population, particularly in rural areas. The sector provides livelihoods for small-scale farmers and contributes to income generation and poverty

reduction. It also serves as a source of raw materials for agro-processing industries, contributing to value addition and export earnings.

Workshops and summits have always been held to supplement the overall growth and advancement of industries and disciplines by bringing together diverse minds. They foster a collaborative environment that encourages the sharing of best practices, innovative ideas, and cutting-edge research.

The third edition of the National Agriculture Summit by Agriculture Sector Network (ASNET) surpassed the previous editions. The two-day workshop at the Kenyatta International Convention Center (KICC) was steered under the theme; ‘LEAVING NO ONE BEHIND: Food and Nutrition Security and Agriculture Competitiveness.’ This summit brought together Millers and farmers and sought to find a solution to the problems facing the Agriculture sector in Kenya.

By investing in agricultural research, technology, infrastructure, and practices, countries can enhance their food production capacity and contribute to food and nutrition security.

The Agriculture and Livestock Cabinet Secretary, Honorable Mithika Linturi was the chief guest. He launched the summit in the company of Principal Secretaries from the ministry among them Hon. Jonathan Mueke, PS state department of Livestock, Hon. Betsy Njagi PS State Department of Blue Economies, and Hon. Patrick Kilemi PS State Department for Cooperatives.

Other notable figures in the sector were also present among them; Dr. Bimal Kantaria, ASNET Chairman and Managing Director Elgon Kenya, Dr. Daniel Guenther, Head of German Development Cooperation, Agatha Thuo General Manager ASNET, Mrs. Jane Ngige ASNET Vice Chair, Kenya Private Sector Alliance (KEPSA) deputy CEO, Mr. Victor Ogalo, Mr. John Macharia, AGRA Country Manager, Dr. Esther Kimani MD PCPB, Mr. Antony Mwangi, CEO KAM, Mr. Wachira Kaguongo CEO NPCK among others.

The summit was anchored on the Sustainable Development Goals for 2030, especially SDG 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), SDG 12 (Ensure sustainable consumption and production patterns), SDG 13 (Take urgent action to combat climate change and its impacts) and SDG 15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss).

Climate change has affected food production and security. Erratic rainfall patterns, prolonged droughts, and increased occurrences of pests and diseases pose significant challenges to agricultural productivity. Climate-smart agriculture practices, such as conservation agriculture and agroforestry, are being promoted to mitigate the impact of climate change. Malnutrition too, remains a significant concern in Kenya. Many

children suffer from stunting, wasting, and micronutrient deficiencies, leading to long-term developmental challenges. It is as a result of this that various interventions, including school feeding programs, fortification of staple foods, and nutrition education, are being implemented to improve nutrition outcomes.

The Kenyan government has prioritized food and nutrition security as part of its national development agenda to enhance value chain development, promote agribusiness, and improve nutrition outcomes. The private sector and non-governmental organizations (NGOs) too play a crucial role in addressing food and nutrition security in Kenya through investing in agricultural research, providing access to credit and markets for farmers, promoting sustainable farming practices, and implementing nutrition programs at the community level with Research institutions too actively being involved in developing innovative solutions to improve food and nutrition security by focusing on areas such as crop breeding for improved varieties, climate-resilient farming techniques, post-harvest management, and nutrition-sensitive agriculture.

Speaking during the summit, Hon. Linturi, stated that there is a need for the country to produce sufficient food for her people without necessarily relying on imports to meet our food requirements, particularly for wheat, rice, and vegetable oil. This dependence makes the country vulnerable to price fluctuations in the global market. The CS said efforts were underway to promote local production of these food items to enhance self-sufficiency.

“We cannot be depending on imports 60 years after independence. We have put in place mechanisms including supporting production and inputs.” Said the CS adding that there was a need to embrace technology and agricultural

To Page 36

From Page 35

sustainability for a promising future of agriculture. “As we navigate a rapidly changing global landscape, we must embrace innovation, sustainable practices, and collaboration to ensure a resilient and prosperous agricultural future,” he said.

He further went on to highlight the need to make the situation fair for marginalized groups as well as women farmers

and smallholders through empowerment and provision of equal opportunities.

“We must recognize the diversity of our farming communities.

Smallholders, women farmers and marginalized groups often face numerous challenges including limited access to resources, technology, markets and knowledge. It is important that we level the playing field, provide equal opportunities and empower them to be a part of the agricultural development,” he stated.

Hon. Linturi also assured farmers of better earnings from the maize they had grown compared to the previous years. “The farmers will make better money from the maize they have grown now compared to the latter years. The cost of production has been cut by over 50%,” he said.

He also promised to embark on a sensitization program for farmers on how to achieve the objective of feeding the nation during a press interview. “Within my ministry and for us to be

able to get to the farmers, I am going into an aggressive program of sensitization of farmers, including organizing field days in all the counties in collaboration with the governors.”

Dr. Bimal Kantaria, ASNET’s Chairman, emphasized the need for county governments to integrate smallholder

farmers into becoming large-scale farmers through empowerment. “The county governments should support stronger farmer organizations to ensure the integration of smallholder farmers and transition to commercially oriented farming.” He said.

According to KEPISA deputy CEO, Mr. Victor Ogalo, for many years Kenya has been hit by

recurrent droughts after every four to five years. This has been a cycle yet every time the drought comes as a surprise. He further backed Hon. Linturi’s statement on overreliance on importations saying, “We buy 80% of the food we eat as a country. In 2021 we imported food worth 155 billion, in 2022 went up to 184 billion, and by April we had imported food worth 201 billion. Let’s find a lasting solution. ”

When the agricultural sector is competitive, it can generate higher incomes and employment opportunities, particularly in rural areas. Increased agricultural productivity; efficient value chains, and improved market access can enhance farmers’ profitability and stimulate economic development.

Therefore, strengthening agricultural competitiveness can contribute to economic growth and poverty reduction and more so alleviate unnecessary importation of foods Kenya can grow. When the agricultural sector is competitive, it can generate higher incomes and employment opportunities, particularly in rural areas. Increased agricultural productivity, efficient value chains, and improved market access can enhance farmers' profitability and stimulate economic development. Economic growth, in turn, can positively impact food and nutrition security by increasing people's purchasing power and access to nutritious food.

Promoting agriculture competitiveness should go hand in hand with sustainability. Sustainable agriculture practices focus on improving productivity while minimizing environmental degradation and resource depletion. By adopting sustainable practices such as conservation agriculture, agroforestry, and water-efficient irrigation systems, agricultural competitiveness can be enhanced in a way that preserves natural resources, protects ecosystems, and mitigates climate change. This sustainable approach contributes to long-term food and nutrition security by ensuring the availability and productivity of agricultural resources for future generations.

According to Agatha Thuo, GM ASNET, 'If Kenya hopes to achieve her food systems transformation agenda, the rolling out of the Agriculture Sector Growth and Transformation Strategy cannot be realized without a deliberate paradigm shift, particularly a drift from BMOs silo mentality to coordinated efforts in advocating for agricultural reforms.'

Climate change has affected food production and security: Erratic rainfall patterns, prolonged droughts, and increased occurrences of pests and diseases pose significant challenges to agricultural productivity. Climate-smart agriculture practices, such as conservation agriculture and agroforestry, are being promoted to mitigate the impact of climate change.

Food and nutrition security in Kenya is a significant issue that the country has been addressing in recent years. While progress has been made, the sector still faces various challenges such as limited access to modern farming technologies, low productivity, climate change impacts, and inadequate infrastructure. Maize is the most important staple crop in Kenya, with a large portion of the population relying on it for

food.

However, the overreliance on maize makes the country vulnerable to price fluctuations, pests, and diseases. All in all, Stakeholders are making strides in diversification in crop production to include other nutritious crops like sorghum and millet.

Unveiling the potential of sorghum

Sorghum Conference brought together researchers, scientists and experts from around the world.

By Marion Aluoch

Scientists, researchers and stakeholders from around the world gathered at the global sorghum conference from June 5-9, 2023, in Montpellier, France, to discuss the latest developments in sorghum research, innovation, challenges and sustainable practices in the face of climate change.

Participating as a sponsor, the International Maize and Wheat Improvement Center (CIMMYT) demonstrated valuable insights and technological advances in a variety of sessions. Two CIMMYT representatives and six

National Agricultural Research Extension Systems (NARES) partners, presented findings, addressing critical topics such as adaptation genetics and genomics, climate and environmental change, sorghum yield optimization techniques and the development of new sorghum products for human consumption.

CIMMYT has initiated a crop improvement program, known as the Dryland Crop Program (DCP), focused on sorghum, millets (pearl and finger millet), chickpea, pigeon pea and groundnut. The program is in the process of establishing a CGIAR-NARES network with stakeholders from 17 countries in Africa to collaboratively create, develop and implement a crop improvement network for these crops in Eastern, Southern, Western and Central Africa.

This cooperative approach will enable CIMMYT and the network to identify suitable products for specific market segments, establish joint breeding pipelines, conduct on-farm germplasm testing and ultimately release and scale up superior seed varieties. This will ultimately lead to improving

the quality and yield of these dryland crops, ensuring food security and promoting sustainable agricultural practices.

Abhishek Rathore presented “Understanding sorghum race level diversity and development of sorghum genomic resources by using deep learning-based variant calling approach,” which examines sorghum’s racial diversity and the creation of genomic resources. Using a deep learning-based variant, researchers identified

race-specific genetic signatures and gained a comprehensive understanding of sorghum race structure and domestication processes. These discoveries pave the way for more targeted breeding programs and the identification of single nucleotide polymorphism (SNPs) markers.

Baloua Nebie presented a poster on “Crop improvement network approach to co-develop market required products and strengthen

partners’ capacities in Africa.” He indicated the dryland crops improvement programs are in collaboration with CGIAR-NARES programs, with CIMMYT acting as a facilitator within the network to deliver varieties more quickly and efficiently in response to market demand. The network is comprised of 10 NARES in Western and Central Africa, seven NARES in Eastern and Southern Africa, as well as farmer organizations and seed companies. In addition to their national roles, NARES partners will contribute to regional activities based on their comparative advantages; these roles include co-sharing of regional pipelines development, early to late testing

With climate change posing a significant threat to global agriculture, NARES partners involved in regional networks have delved into the pressing issues of enhancing sorghum production’s climate resilience.

This interaction provided participants with vital insights into the policies and initiatives affecting the sector, helping them to stay informed and adapt to the changing situation.



The Dryland Crops Program (DCP) partners pose for a group photo at the Sorghum Conference (Photo: Marion Aluoch/CIMMYT)

of breeding lines, product release and scaling. Through consultative meetings and program evaluation, these activities will be aligned with the regional and country-specific market segments identified by stakeholders.

Alex Zongo of the Institut de l'Environnement et des Recherches Agricoles (INERA) / CNRST – Burkina Faso, a NARES partner, presented research analyzing the macro-institutional determinants of the adoption of new sorghum/millet varieties. He shed light on the obstacles associated with the adoption

of new sorghum/millet varieties. The research uncovered the economic and social incentives that prevent their scaling through a combination of qualitative and quantitative analysis.

With climate change posing a significant threat to global agriculture, NARES partners involved in regional networks have delved into the pressing issues of enhancing sorghum production's climate resilience. Rekiya Abdoulmalik, from the Institute of Agriculture Research (IAR) in Nigeria, presented a poster on the threats to sorghum cultivation in Nigeria

posed by current security issues and potential climate change effects. The study evaluated 14 varieties of dwarf sorghum in multiple locations. The analysis identified stable, high-yielding varieties with the potential to contribute to Nigeria's food security in the face of shifting environmental conditions.

Other NARES partners presenting posters included Henry Nzioka from Kenya Agricultural and Livestock Research (KALRO), who made a

To Page 40

CIMMYT also set up an exhibition booth that provided an overview of the various activities undertaken as a part of its dryland crop programs and CGIAR-NARES improvement network.



Mr. Jeffrey Ehlers Program Officer at the Bill & Melinda Gates Foundation engages in conversation with Nebie Baloua from CIMMYT Senegal at the CIMMYT's booth (Photo: Marion Aluoch/CIMMYT)

From Page 39

case for the biological control of the striga weed in sorghum. Citing technological advancements, he illustrated how the integration of climate-smart weed management technologies can lead to the control of the weed.

Another presentation by Charles Bett of KALRO focused on mechanization in the sorghum value chain, which revealed that investments in machinery and traction power have a positive and significant effect on sorghum yield. The findings recommend a shift in policy to help farmers afford small-scale machinery and gradually replace ox power with affordable machinery.

Baba Haoua, from INRAN, Niger, highlighted that introducing specific genes into sorghum varieties through conventional breeding will increase their nutritional content and identify promising lines for local farmers, providing a sustainable solution for improving

sorghum for both grain and livestock feed applications.

Assitan Daou from the Institut d'Economie Rurale (IER) in Mali emphasized the suitability of sorghum as a crop for growing populations in varying climates and the significance of an agroecological transition for adaptation to climate change. His poster presentation centered on sorghum cropping systems under rainfed conditions, which aligned with the conference's goals of increasing crop productivity, adapting to climate variations and bolstering the resilience of small-scale farmers.

The conference, according to Chris Ojiewo, Strategic Partnerships and Seed Systems lead for the Dryland Crops Program at CIMMYT, played a crucial role in sharing the latest sorghum research findings and their outcomes. "The conference provided an important platform for communicating

advances in research and associated outputs and outcomes on sorghum as an important cereal grain contributing to food, nutrition and income securities and overall resilience in agrifood systems especially to smallholder farmers in areas prone to drought stress and more so in the face of changing and variable climates," said Ojiewo.

CIMMYT also set up an exhibition booth that provided an overview of the various activities undertaken as a part of its dryland crop programs and CGIAR-NARES improvement network. Senior officials of donor organizations consulted CIMMYT staff regarding approaches to dryland crops improvements, key achievements and the possibility of new partnerships.

The next 21st Century Global Sorghum Conference will be hosted by Texas University in Lubbock in September 2026.

Bram Govaerts Appointed as CIMMYT Director General



Govaerts was confirmed for a 5-year tenure (2023-2028) after acting as interim leader of CIMMYT since 2021.

By CIMMYT

Bram Govaerts, renowned scientist and leader, has been appointed as CIMMYT's Director General for the period 2023-2028 as of July 1, 2023, after holding the position on an interim basis for two years and steering the organization through the unprecedented global challenges of the pandemic and ongoing food insecurity.

Under Govaerts' leadership, CIMMYT has expanded its research portfolio and strengthened its work in key regions. Govaerts has also started an effort to streamline internal processes and operations to speed up CIMMYT's response capacity and impact across the world.

Govaerts holds a PhD in Bioscience Engineering – Soil Science, a master's degree in Soil Conservation and Tropical Agriculture, and a bachelor's degree in Bioscience Engineering, all from Katholieke Universiteit Leuven, Belgium. He has also received multiple awards during his career: the Development Cooperation Prize from the Belgian Federal Government in 2003, the Norman Borlaug Award for Field Research and Application in 2014, the Premio Tecnoagro, awarded by an organization of 2,500 Mexican farmers in 2018, and Fellow of The American Society of Agronomy (ASA). In addition to leading CIMMYT, Govaerts is an A.D. White Professor-at-Large at Cornell University.

“With Bram's appointment, I am excited and confident about CIMMYT's future,” said Margaret Bath, Chair of CIMMYT's Board of Trustees. “We look forward to many great days ahead for CIMMYT staff across the globe, who lift smallholder farmers and their communities to achieve better and more sustainable livelihoods and to ensure that food security is delivered, and human potential maximized.”

Managing Herbicide Resistance in Cereal Crops

Resistant weeds may develop barriers that limit the entry or movement of the herbicide within the plant, reducing its efficacy.



Herbicides have played a pivotal role in modern agriculture, providing effective weed control in cereal crops, such as wheat, rice, corn, and barley. However, over the years, the widespread and often indiscriminate use of herbicides has led to the emergence of herbicide-resistant weeds, posing significant challenges to cereal production systems worldwide.

Cereal crops are essential staples for human and livestock consumption, providing a significant portion of global caloric intake and dietary needs. To maximize cereal yields and minimize weed competition, herbicides have become an integral component of modern agricultural practices. However, repeated and exclusive use of herbicides has exerted selective pressure on weed populations, leading to the evolution of herbicide-resistant weeds that can survive and reproduce even in the presence of the applied herbicides.

Causes and Mechanisms of Herbicide

Resistance in Cereal crops: Herbicide resistance in cereal crops is primarily a consequence of natural selection. When herbicides are applied to control weeds, a few individual plants in the weed population may possess genetic mutations or traits that allow them to survive the herbicide treatment. These resistant individuals then reproduce, passing on the resistance genes to their progeny, and the resistant population grows over time. The three major mechanisms of herbicide resistance in cereal crops are:

Target Site Mutation: In this mechanism, the resistant weed species undergoes a genetic change in the target site of the herbicide's mode of action. As a result, the herbicide can no longer

bind effectively to the target site, rendering it ineffective in killing the weed.

Enhanced Detoxification: Herbicide-resistant weeds may develop enhanced mechanisms to detoxify or metabolize the herbicide before it can cause any damage. These mechanisms often involve the overexpression of certain enzymes that break down the herbicide into harmless compounds.

Reduced Herbicide Absorption or

Translocation: Resistant weeds may develop barriers that limit the entry or movement of the herbicide within the plant, reducing its efficacy.

Consequences of Herbicide Resistance: The emergence of herbicide-resistant weeds has significant consequences for cereal production systems and agricultural sustainability:

Yield Losses: Herbicide-resistant weeds can significantly reduce cereal yields, leading to economic losses for farmers and food scarcity for consumers.

Increased Herbicide Use and Costs:

Farmers often respond to herbicide resistance by increasing herbicide application rates or adopting multiple herbicides, leading to increased costs and environmental concerns.

Environmental Impacts: The excessive use of herbicides to manage resistant weeds can lead to environmental pollution, harming non-target species and disrupting ecosystems.

To Page 44

India 1st Most

POWER+MILEAGE

Tractor Range

22 hp to 110 hp


INDO FARM
POWER+MILEAGE

Salient Features

- ▶ Powerful Engine
- ▶ 4 Wheel Drive
- ▶ Synchronmesh Gear Box with 12+12 Speeds
- ▶ Heavy 2600 Kg Lift
- ▶ Power Steering
- ▶ Oil Immersed Brakes
- ▶ Multi Speed PTO
- ▶ Dual DC Valve
- ▶ No.1 in agriculture and commercial works



www.indofarm.in

Authorised Distributor :

Agricultural Tractor Spares Limited

33 Dar-Es-Salaam Road, Industrial Area, Narobi

Mobile +254722 209642, +254733 600 593, Email : tractorsales@atslkenya.com

ATSL

From Page 42

Loss of Herbicide Effectiveness: Continuous reliance on herbicides can lead to a decline in their efficacy, making weed control more challenging even for non-resistant weed species.

Strategies for Managing Herbicide Resistance:

To address herbicide resistance in cereal crops, integrated weed management (IWM) practices should be adopted. These strategies combine various management tools and approaches to minimize the reliance on herbicides and delay the onset of resistance:

Rotation of Herbicides: Using different herbicides with different modes of action in successive seasons can reduce selection pressure for resistant weed populations and slow down resistance development.

Crop Rotation: Alternating cereal crops with non-cereal crops disrupts weed cycles, reduces the buildup of resistant weed populations, and provides opportunities for non-chemical weed control methods.

Cultural Practices: Implementing cultural practices such as crop density manipulation, planting date adjustments, and crop competition enhancement can help suppress weed growth and minimize herbicide use.

Mechanical and Physical Weed Control: Utilizing mechanical weed control methods, such as tillage, hand-weeding, and mulching, in combination with herbicides can provide effective weed management while reducing herbicide reliance.

Biological Control: Harnessing natural enemies of weeds, such as insects, pathogens, and competing plant species, can help control weed populations and reduce the need for herbicides.

Future Prospects:

To ensure the long-term sustainability of cereal farming and effectively manage herbicide resistance, ongoing research efforts should focus on the following areas:

Development of New Herbicides: Investing in the discovery and development of new herbicides with novel modes of action can provide alternative options for weed control and overcome existing resistance mechanisms.

Molecular Approaches: Advancements in molecular biology and genetic engineering can facilitate the identification of resistance genes in weeds, allowing the development of diagnostic tools and tailored management strategies.

Precision Agriculture Technologies: Integrating precision agriculture technologies, such as remote sensing, GPS, and machine learning, can enable site-specific herbicide applications and optimize weed control efforts.

Adoption of Weed-Competitive Cereal Varieties: Breeding and selecting cereal varieties

with enhanced competitive traits against weeds can help suppress weed growth and reduce herbicide dependence.

Managing herbicide resistance in cereal crops requires a comprehensive and proactive approach that integrates multiple strategies. By adopting integrated weed management practices, promoting sustainable agricultural practices, and investing in research and innovation, we can minimize the development and spread of herbicide resistance, preserve the efficacy of herbicides, and ensure the long-term viability of cereal farming systems.

Herbicide resistance in cereal crops is primarily a consequence of natural selection. When herbicides are applied to control weeds, a few individual plants in the weed population may possess genetic mutations or traits that allow them to survive the herbicide treatment. These resistant individuals then reproduce, passing on the resistance genes to their progeny, and the resistant population grows over time.

Improve crop yields **NATURALLY!**




Organix Limited
The Farmer's Environmental Friend



an organic seaweed
extract to reduce
transplanting shock &
improve root systems

- Deeper Vigorous Root systems
- Greener Foliage
- Increased tillers & stronger stems
- Uniform heads & grains
- Improved bushel weight
- Helps moisture stress
- Foliar spray at 2ml per Litre of water at 3-5 leaf stage

EARTHLEE®
humus for improving
soil structure

- Frees locked nutrients
- Coating onto granular fertiliser reduces loss of nutrients (leaching) & stronger stems
- Helps in introducing humates into the soil
- Coat 50Kg granular fertilizer with 1Kg Earthlee

P.O. Box 14494
Nairobi 00800 Kenya
Fax: +254 20 3742605

Tel: +254 20 3741482 / 3566241/2
Cell: +254 735 712090 / 720 937535

eco@organix-agro.com www.organix-agro.com

ELGON THABITI FERTILIZERS

DAP | CAN | UREA | NPK

Why Use THABITI® Fertilizers.



They Contain All The Registered Nutrients.



Each Granule Contains The Correct Ratio Of All Essential Nutrients & Reduce The Risk Of Yield Loss.



Have The Benefit Of Uniform Distribution Of All The Nutrients Across The Entire Field.

50kg, 25kg & 10kg



THABITI® TOSHA

