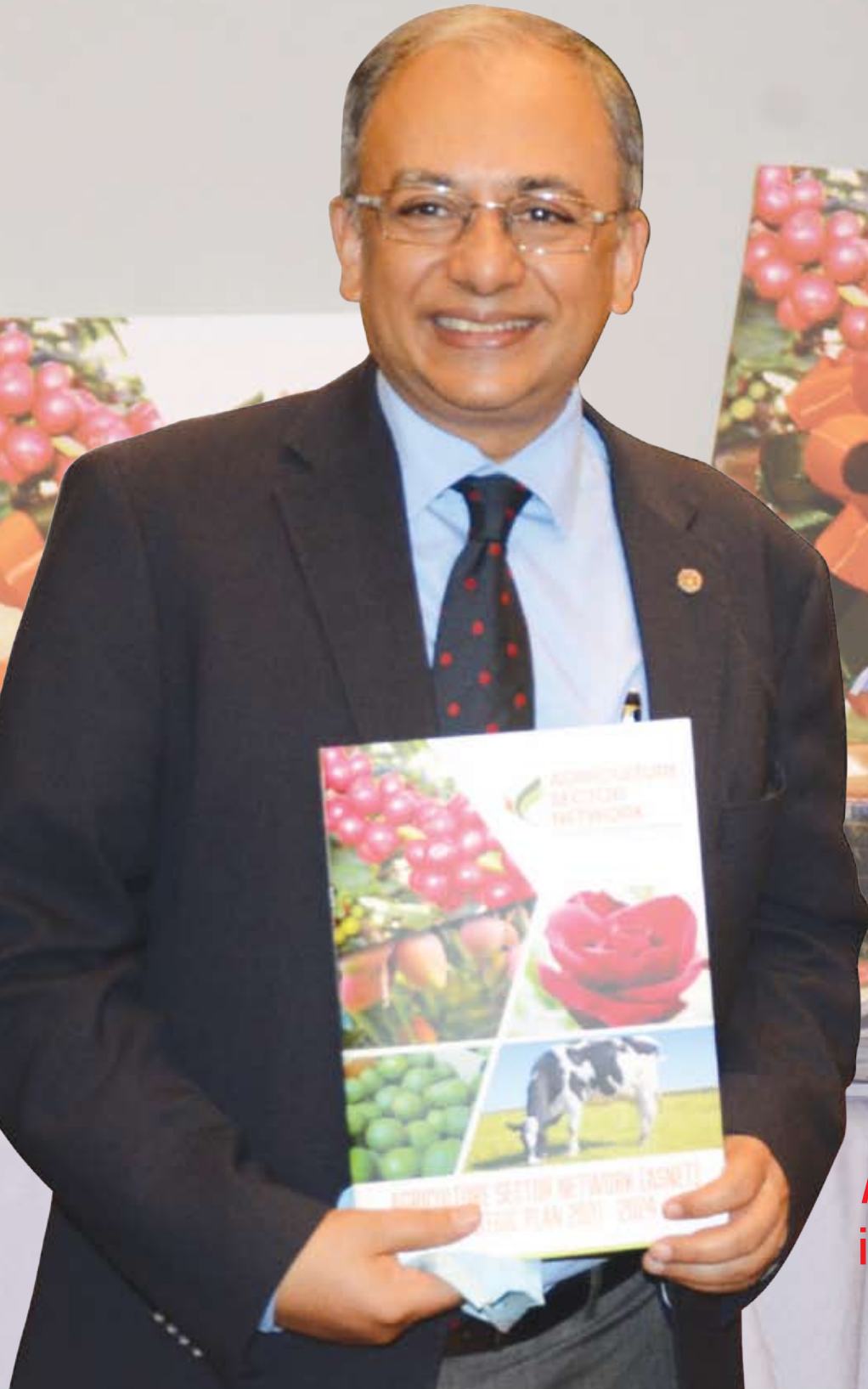


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ASN Launches
its Strategic Plan



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Editorial

Farmer Under Stress, Time to Unlock the Chains.

A year into a global pandemic which upended how we work and live, the complexity and intensity of the challenges many people are facing exceeds their emotional resilience. And the understanding what's happening in your body, mind, and emotions is at least as important to sustainable performance as the skills you bring to the work you do. Let us look more deeply at how we react to different levels of stress in our lives. They present here a roadmap for better stress management grounded in the premise that human beings don't operate from a single stable self. Rather, we unconsciously move between three primary selves - the child self, the defender, and the adult self - which vie for attention and control, depending on the demands we're facing.



In this issue, Eric Kimunguyi, the AAK CEO, in his opinion, Europe is determined to line up Africa in its own camp, funding it to ban pest control as a 'precaution, just in case it might do damage that no science has shown it does. A stress to the farmer. In addition, Evelyne Pamba, Intergrated Field Scientist with Corteva Agriscience reminds us the evolution of herbicide resistant weeds is a serious problem facing the global agricultural community. A stress to the farmer. To crown it, Dr. Roger Price takes us through the most destructive migratory pests in the world, the Locust. He tells us that they can cause unmatched loss of crop and farmland threatening food security across the planet. A stress to the farmer.

The farmer is stressed by these and many more. So, what next? Farmers should not live in fear of mistakes, missteps, and disappointments because if you're not prepared to fail, you're not prepared to learn.

*Masila Kanyingi
Editor*

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Cereals

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Why Europe wants Africa to end crop protection in case science one day shows it's harmful

By Eric Kimunguyi, CEO, CropLife Kenya/ Agrochemicals Association of Kenya



There is a certain state of mind where someone is so sure something is true they consider all information as proof, and ignore everything that suggests otherwise. It's how the majority of the world's population believed the Earth was flat long after measurements showed the curve on the planet's surface and its changing position relative to the sun and stars.

For, when you want to believe the Earth is flat, facts are only an interference.

And so it is with the current fashion for declaring that spraying locusts or any insects that eat part or all our crops is necessarily bad, even when there is no evidence

at all that's the case. Indeed, so extreme is the anti-pesticide noise that we are in danger of plundering our food output and increasing our dependency on Europe for generations ahead. Some have even called it the new colonialism, in a mounting battle of ideas around food that is dividing the world, with the United States, Australia – and now the UK and France too – going one way, and the rest of Europe heading in the

opposite direction.

Moreover, Europe is determined to line up Africa in its own camp, funding it to ban pest control as a 'precaution, just in case it might do damage that no science has shown it does.

Take bees. Bees are pollinators, which means they fertilise many

fruits and crops. But in Europe and Asia their numbers have fallen dramatically. The principal cause is a tiny mite that has invaded commercial hives carrying viruses that infect the bees and cause them to die.

Many commentators suggest other factors might be at play in suppressing the bees' immunity to the viruses. Cambridge University, for instance, has reported that commercial bees, which are different from Europe's wild bees, have been weakened by their lack of genetic diversity.

Moreover, their previous explosion in numbers has seen them competing for resources with their wild brethren and driving many wild bees out of existence too.

Who knows if Cambridge University is right, but it does have some powerful academic credentials.

However, Africa's situation different. It has far fewer commercial bees, but those it has are related and still intermix with its wild bees. Many scientists have now cited this as the main reason their numbers are not collapsing.

But while this real, fact-based debate goes on, another opportunistic one is underway. Europe's green movement isn't interested in mites, or viruses, or Cambridge University's findings on genetic varieties. The public understands (and sends donations on) simple messages, and what can get simpler than 'pesticides are killing bees'. So they say it, a lot, blaming the world's newest class of insecticides, called neo-nicotinoids.

There doesn't happen to be any science to support that. Take one recent African study funded by the German Federal Ministry of Education and Research (BMBF) on the use and effects of neo-nicotinoid insecticides in African agriculture. It promised a review of all the studies and science on the matter.

Yet, in its first paragraph of a 68-page report, it states: "experience in Europe and America has demonstrated that some agrochemicals – in particular the systemic insecticides typified by neonicotinoids – have serious negative effects on ecosystem services such as pollination". It says this, because some unidentified parties' "experiences" is all it has, with not one reference to any scientific study showing that in the entire 68 pages. The US Environmental Protection Agency, meanwhile, once again renewed its approval of neo-nicotinoids in 2020, based on the actual science.

The African study did find one case where neonicotinoids were used to kill mites on cocoa, but killing the mites saw a proliferation of secondary pests the mites normally fed on – so, not neonicotinoids harming pollinators, but the removal of a predator causing new issues.

But the scientists concluded that to review all the literature would be too expensive and that it was better to stop the use of neonicotinoids anyway on a "precautionary" basis.

So, another report that mentions throughout that neo-nicotinoids damage bees without a single piece of evidence to that effect, but which proposes banning, just in case they do, which is exactly what Europe has done, whereas the US is confined to acting on claims that have scientific evidence.

In Africa, the difference these insecticides make to our yields run from 10 or 20 per cent to nearly 100 per cent crop loss without them. But our food comes cheap when you have a foreign point to make.



So it's up to us whether we want scientific proof that bees are dying from neonicotinoids, of which there is none yet, or to ban them and drop a third of our food production just to show our solidarity with parts of Europe. Because even parts of Europe aren't for this evidenceless 'precaution'. France has overturned the EU ban, Romania has, and, within one week of leaving Europe, the UK did too. So does our food security matter, and do facts matter? They should.

Eric Kimunguyi is the CEO, CropLife Kenya/ Agrochemicals Association of Kenya and the views expressed here are his own and not necessarily those of Cereals Magazine. -Adopted from Kilimo News.

It was pomp and colour as ASNET launched the first Strategic Plan 2021-2024 at Crown Plaza Hotel, Nairobi. The Strategic Plan will guide ASNET towards accomplishing its mandate in realizing its aspirations through partnerships to contribute to the revolution and transformation of the agriculture sector.

The event was officiated by Dr. Kevit Desai, Principal Secretary in the State Department of East African Community (EAC), Prof. Micheni Ntiba, Principal Secretary in the State Department for Fisheries, Aquaculture and the Blue Economy and Harry Kimtai, Principal Secretary in the State Department of Livestock. Others who graced the event included Government officials, development partners, businesses, and associations in the agriculture sector.

Speaking at the launch, ASNET Chairman Dr. Bimal Kantaria thanked the development partners, businesses, and associations for their technical and financial support in the process of developing the strategic plan. The plan is a culmination of the seed planted during the ASNET Summit held on the 26th and 27th February, 2020 at Safari Park, Hotel. He said the strategic plan is anchored on best practices in organizing and coordinating private sector actors both regionally and globally. It will be implemented through



Historic moments for ASNET following the launch of their first strategic plan. The strategic plan will guide ASNET towards accomplishing its mandate and realizing its overall objective through partnerships in an effort to transform and revolutionize the agriculture sector by focusing on its core functions.



4. Inclusivity of agriculture sector growth; and
5. Development of a lean, functional and effective ASNET Secretariat

Members were called to give their invaluable support to ensure that ASNET is a credible and trusted Voice of Kenyan agriculture offering a unique and definitive membership experience.

ASNET Chairman also acknowledged its founding institutions namely; Kenya Private Sector Alliance (KEPSA), Kenya National Chamber of Commerce and Industry (KNCCI), Kenya Association of Manufacturers (KAM), UN Food and Agriculture Organization and United Nations Development Programme (UNDP's) Sustainable Development Goals (SDGs) Platform that continue to support ASNET.

Pomp and Colour as Agriculture Sector Network (ASNET) Launches its Strategic Plan

annual work plans that will track progress and will be regularly reviewed to respond to emerging opportunities.

The five strategic issues at the center of the ASNET's strategic plan are:

1. Mainstream the agriculture related Policy, legal, regulatory and institutional aspects for a competitive and enabling business environment;
2. Consolidate fragmented agriculture private sector actors;
3. Development of Agriculture value chains;

The launch was proudly sponsored by FAO, United States Development Agency (USAID) through the Kenya Crop and Dairy Market System Activity implemented by RTI International, Elgon Kenya Limited and Twiga Chemicals.

PICTORIAL



ASNET Chairman Dr. Bimal Kantaria (right), Vice Chair Mrs. Jane Ngige (left) and ASNET General Manager Agatha Thuo (second from left) met with GIZ team Michael Duerr (2nd from right) and Prisca Watko (3rd from right) to discuss the current and future partnerships between ASNET and GIZ Kenya.



ASNET Chair Dr. Bimal Kantaria presenting the ASNET Strategic Plan to the Governor of Kiambu County who is also the Chairman of Agriculture at Council of Governors Hon. Dr. James Nyoro.

The Agriculture Employers Association (AEA) chairman Mr. Tom Ochieng (center) and Chief Executive Wesley Siele (right) paid a courtesy visit to ASNET Chairman Dr. Bimal Kantaria. They agreed to work together in the counties and also at the national level on agriculture sector issues.



ASNET Chairman Dr. Bimal Kantaria (2nd from right), Devolved Agriculture Committee Chair Mrs. Lucy Muchoki (3rd from Left) and General Manager Agatha Thuo (4th from right) paid a courtesy call to Council of Governors Chief Executive Mrs. Jacqueline Mogeni (3rd form right) to discuss areas of collaboration at the county level. ASNET aims at creating county Boards in all the 47 counties in support of a devolved agriculture.



ASNET Members together with Government officials during the launch of the ASNET strategic plan

The Impact and Benefits of Soil Management & Research

Hear from soil health advocates and scientists as they share how healthy soils can impact our environment, our global food systems and mitigate climate change.



Healthy, nutrient-rich and biodiverse soil is not only vital to the sustainability of global agriculture, but it is essential for farmers to grow nutritious crops that keep humans healthy.

This concept—improving soil health—is a concept that has really caught fire across a large portion of Kenya farming systems. Farmers realize that not only are there multiple environmental benefits in improving soil health, but it also improves the profitability of their operation by supporting higher yields, retaining water deeper in the profile that improves resilience to drought and more. There's a little bit of up-front investment, but a huge amount of long-term payoff.

Policy decisions that prevent the adoption of plant science and soil management technologies have had a huge negative impact on our ability to reduce CO2 concentrations in the atmosphere and on our ability to avoid soil degradation. These technologies are absolutely critical to maintaining healthy soils.

Healthy soils are not just about maintaining farm yields either, they

are also about improving communities and livelihoods. It is directly harmful to people in these areas that are unable to farm, maintain crops – especially during droughts – and avoid excessive loss of soil as well as they could be. There's a whole host of bad things that happen when you don't use these regenerative farming techniques to help restore soil organic matter and basically leave the field in a better place for future generations.

Healthy soil retains more water, which means you can actually reduce the amount of runoff, sediment and erosion in those fields. We can employ practices in our agriculture systems to help reduce the impacts to water quality. These very same practices have benefits to soil health. So,



there is an interaction there, and therefore it's important for people to be aware of that and support practices that help farmers make the right decision with respect to how they grow their crops.

Studies have demonstrated that if you're growing crops in healthy soils, you actually see improved nutrition profiles in the crops. Even when it's used as animal feed, all those nutrients that go into the animal ultimately end up in the animal products we consume. So, every effort that the farmer employs to improve soil health ultimately has other tremendously positive impacts, from economic, environmental and human health perspectives.

There are two big ways in which soil health helps us in climate change – adaptation and mitigation.

Adaptation is where we attempt to adapt to climate as it changes around the world. We can see temperatures rising of course, but for most farmers, the biggest issues are unpredictable droughts and heavy rains. Farms with healthy soil can absorb those heavy rainstorms much better than the ones not employing practices like conservation tillage and cover crops. It is absolutely true that we can adapt to climate change better and build our resilience to more extreme weather by having healthy soils.

The other side is mitigation. As we all know, the most important of the greenhouse gases associated with humankind is CO₂, and of course the "C" is carbon. Soil itself has carbon in the form of primarily organic matter, and it's that organic fraction of carbon in soils that can be enhanced through the use of the

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“ Studies have demonstrated that if you're growing crops in healthy soils, you actually see improved nutrition profiles in the crops. Even when it's used as animal feed, all those nutrients that go into the animal ultimately end up in the animal products we consume”



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types of practices we are talking about – conservation tillage, cover crops, rotation, etc. – thus reducing it in the atmosphere.

Impact of crop protection and plant biotechnology

Soil health involves everything from nutrient management to microbial activity to compaction and moisture

retention. As the industry continues to innovate, we ask ourselves things like, “How can that technology reduce the number of passes through the field and, by extension, the potential for compaction?” or “How does this new product or approach help us put nutrients in the right place at the right time, without negatively impacting the microbes in the soil or losing nutrients

into the surrounding environment?”

Technology and plant science innovations can go hand-in-hand with the work researchers are doing.

Integrated pest management effect to preserve soil health

Having healthy soils is foundational to a long-term, sustainable future for



There have also been significant advancements in the ability to measure soil properties and functions, both in the field and in the lab. Farmers need to continue connecting to those resources and implement them where feasible given research design.





agriculture – from building soil structure to increasing water-holding capacity to fixing nitrogen and sequestering carbon. If we can focus on increasing the productivity and functionality of our soils, we have a greater likelihood of farming in a way that is both economically and environmentally viable for many generations to come.

Many soil health practices have co-benefits that improve wildlife habitat, biodiversity and the environment. Our partnerships with leaders in measuring those specific co-benefits allow us to share the whole story of agricultural sustainability.

We believe that, as farmers and people who work in agriculture, we have a

responsibility to take care of the resources we've been given. Being a good steward of the land, water and air is something that the farmers we work with care deeply about. Thinking through how a certain management practice – for example, tillage, cover crops or grazing livestock – impacts not only yields but the other systems in our environment is something we discuss with growers regularly.

What type of technologies are used to study soil health?

On the farm, we leverage technology in a number of different ways. We use drone UAVs (unmanned aerial vehicles), which are a great tool during our field checks in combination with traditional on-the-ground observations.

There have also been significant advancements in the ability to measure soil properties and functions, both in the field and in the lab. We continue to connect farmers to those resources and implement them where feasible given research design.

Economic implications of failing soil health

Economics can't be left out of any conversation around sustainability or conservation – after all, it's in our mission to build soil health in a way that is not only environmentally beneficial but also economically beneficial. If we don't invest in building soil health, costs can add up in multiple ways.

I prefer not to think of what we could lose, though, but rather what we stand to gain. We've been involved in financial analyses that continue to show that practices like reduced tillage save farmers money in reduced labor and fuel, as well as save time by making fewer passes across the field. And while the financials around cover cropping are more complex – since there is an additional investment in seed costs and time to plant/terminate – there are long-term benefits when you look at what you can gain in microbial activity, nutrient cycling, potential weed control, moisture uptake, etc.

The big thing to remember is that yield isn't the only way to measure success. Having a goal for implementing a practice is key to evaluating success. When we start looking at things like reduced expenses, net profit over time, and resiliency to weather, there are definite benefits to investing in soil health.

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Connecting with food systems

Soil is the base of the FoodShot—you have got to start from the ground up. You can't have a healthy food system if you are degrading your soil. And there are a lot of historical examples of societies that destroy their soils and are faced with, basically, the end of their empires.

We really need to think about regenerating and restoring the health of the soil we are already using. A lot of that is about how you manage though, and there are some really simple ways like crop rotation, cover crops, no-till and other technologies to reduce the amount of land we need.

soil health. In some ways, we have the ability to be much more precise now in the tools that we use. We really need to be focused on identifying those tools and making sure that they're usable and affordable. There are real opportunities to evolve into a healthier food system that supports ecosystem biodiversity and farmer profitability at the same time.



What impact does soil erosion have on smallholder farmers in the Philippines? Salguero: Soil erosion is undermining productivity for smallholder farmers in sloping areas. Soil erosion causes fertile topsoil to be carried away and lost. In some cases, farms are totally lost due to stream bank erosion. Erosion



The life within soil, the microbiome is incredibly complex. We are just unlocking the secrets that are absolutely essential to soil function, nutrient cycling, plant health, disease prevention, carbon sequestration, soil fertilities and so on.

Regenerative healthy soil practices

We can't continue to grow land on soil that's been depleted and eroded. One of the biggest challenges in feeding the planet is to do it without expanding the amount of land cultivated. The more that we expand agricultural land, the more we push into forests, grasslands and natural habitats.

We have to do more with less and be more efficient to feed the planet without converting the entire planet to land for crops. We must start with managing the soil we are using already.

Impact of innovations in plant science to soil carbon measurement and microbiome functionality

A lot of companies are now looking at harnessing the microbiome and the biology of soil to improve and protect

also impacts farms in low-lying areas. The soil lost from sloping areas gets deposited at lower elevations, blocking the flow of water from the river systems. This causes more frequent flooding and consequently, the destruction of crops and properties.

NEW PRODUCT ALERT

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Diseases Controlled in wheat



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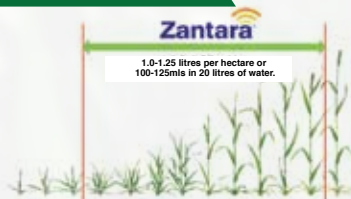


Yellow Rust

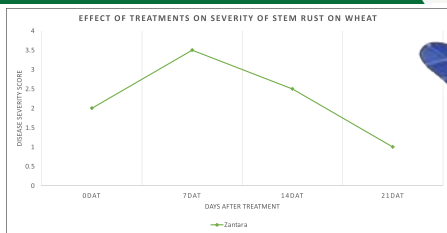
Application Rate

Crop	Disease	Application rate	Timing/Remarks
Wheat	Yellow Rust, Stem Rust	1.0 - 1.25 l/ha in 200 litres of water/ha. 100-125mls in 20 litres	Apply at the first signs of infection before 5% infection level is reached. Repeat application after 2-3 weeks, at high infection pressure. Not recommended to spray when the leaves are wet. Pre-Harvest Interval is 35 days

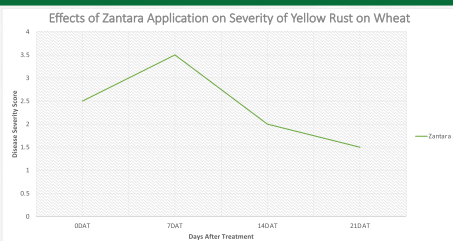
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Evolution and Management of Herbicide-Resistance

Herbicides are the primary economic means to control weeds and they play a crucial role in helping humanity feed itself. The evolution of herbicide-resistant weeds is a serious problem facing the global agricultural community — they threaten regions, economies and the livelihoods of farming families. But herbicide resistance can be managed. *Cereals Magazine* Editor *Mr. Masila Kanyingi* spoke to *Evelyne Pamba*, Intergrated Field Scientist, Corteva Agriscience to elaborate it further and help farmers understand it better. Below are the Excerpts

Briefly define a weed?

A weed can be a plant growing where it is not wanted or plant out of place. It can also be referred to a plant that is a nuisance or a plant that is undesirable.

What is Herbicide?

Herbicide is defined as a plant protection product used to eliminate unwanted plants or prevent them from growing while leaving the desired crop. It can be either selective or non-selective. Selective herbicides clear unwanted plants while

leaving the desired crop unharmed while on the other hand non-selective herbicide will kill all the plants they come in contact with.

Agronomists are warning farmers on herbicide resistance, can you explain this in a layman's language?

Globally we have a body known as HRAC (Herbicide Resistance Action Committee). This is an international body founded by the agrochemical industry, helps to protect crop yields and quality worldwide by supporting efforts in the fight against



herbicide-resistant weeds. It defines Herbicide resistance as the natural ability of a weed biotype to survive an application of an herbicide that previously killed it.

A number of cases of herbicide resistance have been documented in more than 100 weed species around the world. These weeds present on-going challenges to growers and the agriculture industry.

It is important to note that herbicide resistance does not imply poor performance of the product or herbicide tolerance (the inherent ability of a species to survive and reproduce after herbicide treatment at a normal use rate)-Normally never used to kill it from the beginning.



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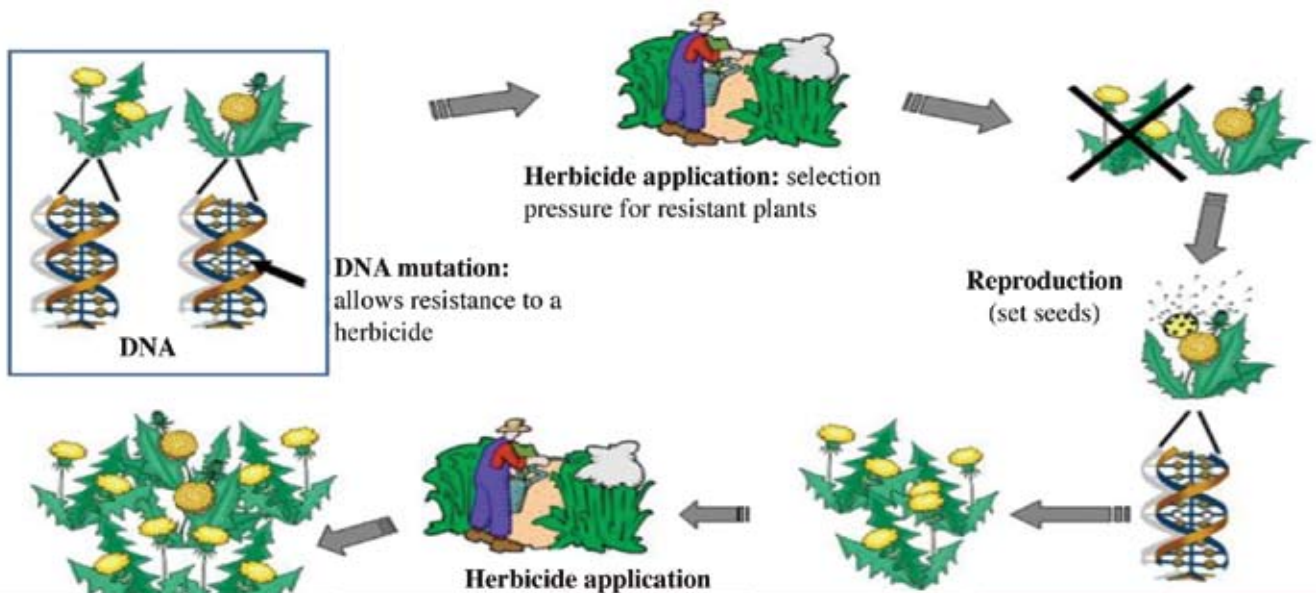


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MAIN STORY

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What factors favour resistance development?

Farmers will always use what is working for them. However, it is important to note that a repeated use of a specific herbicide or a combination of herbicides with same mechanism of action can result to resistance because we are increasing the selection pressure. In addition, weed populations with wide genetic diversity may also develop resistance rapidly, especially for herbicides with a single mechanism of action.

Within any weed population there may be some plants that already contain a rare change in a gene (or genes) that enable them to survive the application of a particular herbicide that would normally kill this species. Genetic variation may alter physiological traits that enable herbicide uptake, translocation and activation at the site of action. Alternatively, changes may influence the plant's ability to detoxify herbicides, or enable transport to a site within the plant where the herbicide is not lethal. Each time the herbicide is applied, susceptible plants die and those with resistance survive.

Resistance occurs where diversity in

management is low. Monocrop, big farms, lack of mechanical and/or cultural control methods, use of only one mechanism of action herbicide increases the selection pressure of plants resistant to a method of control. Resistance could affect whatever method we use repeatedly.

Lastly, resistance is also influenced by a high genetic diversity (pollination type, population size) and fecundity (n° of seed per plant), high rates of weed migration/spread, and diverse environmental conditions.

Discuss the different types of herbicide resistance

We have mainly two types of known resistance, namely;

Cross resistance: This occurs when a weed population is resistant to more than one herbicide subgroup within similar MOA group. For example, populations of wild oats that are resistant to group A 'fops' *Aryloxyphenoxy-propionate* (e.g. *fenaxaprop*) may also be resistant to group A 'dims', Cyclohexanedione (e.g. *tralkoxydim*) even though they have not been exposed to a herbicide from the 'dim' subgroup. This is usually target-site resistance. It may arise without the weed

population ever being exposed to one of the herbicides.

Multiple resistance: Multiple resistance is a term used to describe weed populations that exhibit more than one resistance mechanism, allowing the plant to withstand herbicides from different subgroups. Some populations of resistant annual ryegrass possess both target and non-target site resistance. For example, one population of annual ryegrass exhibits resistance to five different herbicide MOA groups.

Describe the different types of resistance mechanisms?

The two common mechanisms of resistance to herbicides are:

Target-site Resistance: This results from mutations that alter the herbicide binding site (often within an enzyme) preventing or reducing the ability of an herbicide to bind to the target site, allowing the target-site protein to remain functional. Where the herbicide has such little inhibitory effect on the site of action, plants may survive greater than 10 times the normal herbicide rate (considered high-level resistance).

Mechanisms of action where high-level resistance is most often seen include

ACCCase, ALS, triazines, dinitroaniline and photosystem II inhibitors.

Metabolic Resistance (Non-target Site):

Non-target site resistance (also referred to as metabolic resistance) is used to describe mechanisms other than changes at the target site which enable an individual plant to survive an herbicide application. The potential mechanisms include reduced herbicide uptake, reduced translocation, reduced herbicide activation, enhanced herbicide detoxification, changes in intra or inter-cellular compartmentalization and enhanced repair of herbicide-induced damage.

This type of resistance is more complex than altered target –site resistance type because it involves several plant processes. Plants with altered metabolism resistance can degrade several unrelated herbicides of different modes of action through multiple genes controlling metabolic processes. Plant injury may occur because plants cannot rapidly degrade absorbed herbicide, causing this mechanism to be considered low-level resistance. Increasing the herbicide rate to smaller plants may control more plants.

What is selection pressure?

Selection pressure is a term used to describe the amount of selection for resistance applied by the herbicide application. Every time an herbicide is used, susceptible individuals are killed and resistant individuals survive. The greater the number of resistant individuals that survive, the higher the selection pressure.

How can you manage herbicide resistance?

Remember, the key to prevention of herbicide resistance is to reduce

selection intensity and utilize herbicides with restraint within an overall Integrated Weed Management strategy.

Cultural Practices:

- Rotate crops (particularly those with different life cycles)
- Incorporate non-chemical weed control measures
 - Use cultivation and mechanical hoeing where possible. Also consider post-harvest grazing, mowing, stubble burning, etc to prevent seed set or survival.
 - Delay planting to allow removal of initial weed flushes
 - Use weed-free or certified crop seed and manage crop to maximize competition
 - Use tillage as a component of the



weed management program.

- Scout fields regularly to identify potential issues and eliminate weed escapes. Keep good records of weed populations.
- Prevent spread of resistant weeds by thoroughly cleaning tillage and harvest equipment as it moves from field to field. Also do not allow resistant weeds from total vegetation control areas (i.e. fence rows, railroads, public utilities, etc) to spread to cropland.

Herbicide Management Practices:

- Use herbicides only when necessary

- applications should be made based on economic thresholds
- Rotate herbicides with different sites of action
 - within and across successive field seasons
- Apply herbicides in tank-mixed, prepackaged or sequential mixtures that include multiple sites (modes) of action
- Follow label directions for recommended use rates and application timings to ensure best efficacy
- Monitoring of weeds escapes after herbicide application.

Give your final comments?

The fight against herbicide-resistant weeds is now at a critical point. For more than 40 years farmers have coped with herbicide resistant weeds because the industry provided them with a relatively steady stream of new herbicides with novel herbicide sites of action. This is no longer the case now, industry has been slow in innovations and the rapid rise of multiple resistance in weeds leaves many farmers with increasingly intractable weed control problems.

The best resistance-management strategies will involve the use of every available weed control tool (integrated weed management) in an effort to disrupt and destabilize weed populations to prevent them becoming a serious problem. We should try to be unpredictable when managing weeds and apply as much diversity as possible.

Regardless of whether resistance has appeared in a field, crop production systems that involve use of herbicides should always incorporate other practices to prevent and manage for its eventual occurrence.

Future of Beans has Never Been Brighter

“Beans farming in Kenya is not as common as maize. However, it is one of the common grown crops in Kenya”



You probably interact with beans often enough to react when it appears in a story headline. You probably also note that when there is a discussion on main cash crops in the country, beans are not usually among the first suggestions. Yet, Kenya earns a fortune from the export of beans, as much as it benefits from having a population pumped with the proteins that beans boast. It, therefore, should be in the national discourse that beans production declined by 10.8 per cent to 8.3 million bags in 2019.

Kenya harvested 8.5 million bags of the legume in 2015, 8.1 million in 2016, and an impressive 9.4 million in 2017, the Kenya National Bureau of Statistics (KNBS) data show.

The figures declined to 9.3 million in 2018 and later to 8.3 million in 2019. That was a drop of a cool one million bags in the year. The year 2019 will be remembered as grim and unforgiving to the agricultural sector. The year began

with a semi-drought, the long rains usually experienced around April failing. The Famine Early Warning Systems Network blamed the failure of Kenya's long rains on tropical cyclone Idai, which "redirected moisture away from the region."

When the KNBS releases their next batch of data, a possible increase in production in 2020 will amplify the extent of decline experienced in 2019.

In 2017, when production of beans was at its peak, the price was also the highest recorded in the past half a decade, in the latest Economic Survey of 2020.

A kilo was going for Sh93.96 in March of the year, the peak price, against Sh77.01 in March 2019. The head of Horticultural Crops Directorate (HCD), which regulates the horticulture industry through licensing and application of rules, in a recent interview, put French beans among crops that are, and will remain, lucrative for the Kenyan market.

He highlighted some of the issues affecting Kenyans in their quest to maximise production of some of these crops, including beans. "Farmers should focus on high value horticultural crops such as French beans, snow peas, carrots, onions. But farmers also need access to farming quality inputs, credit facilities and capacity building on good agricultural practices."

Majority of Kenyans grow beans as a subsistence crop, often planting in rows alongside other "main" crops.

"Beans farming in Kenya is not as common as maize. However, it is one of the common grown crops in Kenya. In fact, it is often inter-cropped with the main crop for maximum absorption of

nutrients by both plants," writes Oxfarm, a website that is a farmers' market place. But beans are often a part of every meal.

Grown as cash crop

"Beans popularity in Kenya may be due to the fact that bean recipes are numerous and beans are consumed almost with everything and contain quite a considerable amount of protein," writes Oxfarm.

The market for beans is high locally and internationally. Data from HCD showed that beans earned Kenya at least Sh300 million a month in 2020.

Like for every product, it is just the rare types of a beans that fetch the best prices. With demand exceeding supply, bean species that grow only in select places are always sure to fetch market. "Depending on quality and type of beans, the prices per 90 kg bag of beans

The varieties

Some varieties are also more expensive than others. The rose coco and kidney beans, for instance, are a bit pricey compared to the other varieties which are available in large quantities. Beans with a high supply across the country will fetch a lower price compared to those that thrive in specific areas.

Prices aside, the market for beans, often part of githeri, an easy-to-prepare staple food in parts of the country, is always available, Oxfarm says.

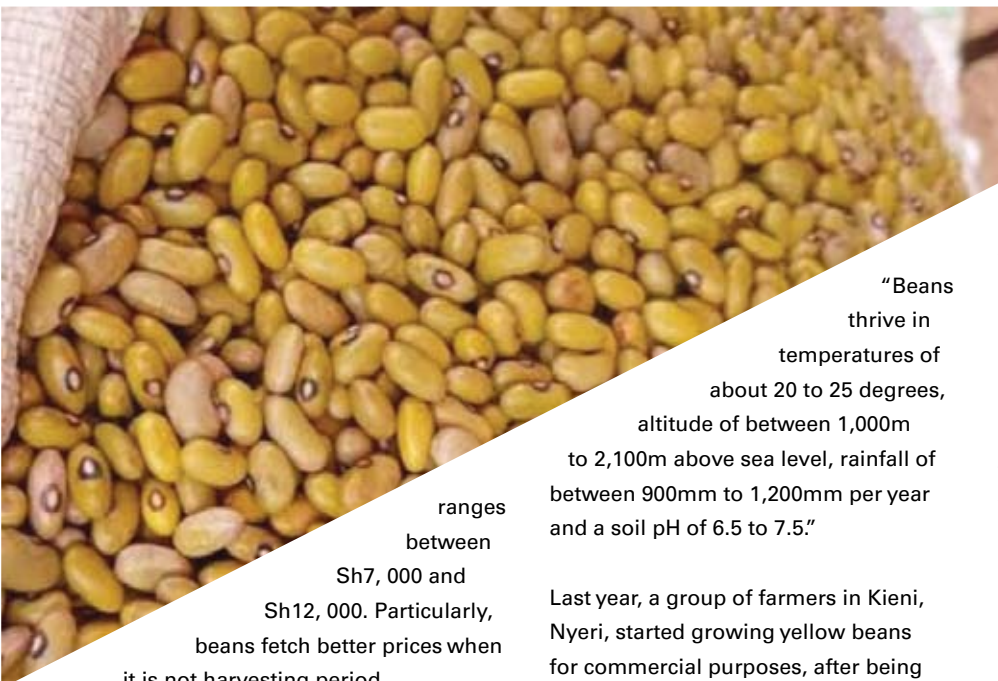
"Irrespective of the type of beans, the market is always there and since it's a grain, you can store it and sell when the prices are high."

Farmers in some locations have resorted to growing beans as a cash crop, backed by suitable ecological factors, including favourable temperatures and rainfall.

drained economically in seasons that saw their other cash crops fail due to lack of adequate water.

"Before I got into commercial yellow bean farming, my focus was potatoes, french beans, snowpeas, capsicum, which I often sold off to brokers to make money," said Robert Kahoro, a farmer in Kieni.

Bean farming was only for local consumption and he had not discovered that he could do it as a business. But now he is reaping big. "One acre of yellow beans can earn me up to Sh90,000, and that with a low cost of production unlike other horticultural products, and they can be stored in hermetic bags for as long as I need to ensure I get the best deal for my produce," he said, adding that he had joined hands with twenty other farmers to supply beans in large scale to some of Kenya's biggest retailers.



Like Mr Kahoro, farmers planting beans are unlikely to meet a dearth of markets. "There is high potential because demand for horticultural produce for local and export market is increasing with rising world population," said HCD director. To change from subsistence to commercial farming is probably the masterstroke.

Good Farming Practices

Before planting the legume crop, farmers must make sure the farm is well-prepared. Ploughing is done twice and this has to be done before the onset of rains.

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ranges between Sh7, 000 and Sh12, 000. Particularly, beans fetch better prices when it is not harvesting period.

"Beans thrive in temperatures of about 20 to 25 degrees, altitude of between 1,000m to 2,100m above sea level, rainfall of between 900mm to 1,200mm per year and a soil pH of 6.5 to 7.5."

Last year, a group of farmers in Kieni, Nyeri, started growing yellow beans for commercial purposes, after being

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How the crops are spaced during planting, also matters a lot. Something between 5 to 10 centimetres, with rows at one and a half feet, is good enough.

Using rows when planting is encouraged for easier management of the crop during production. Spacing is also key to quality production. Overpopulating the plants might lead to nutrient deficiency in the soil.

At about 21 days after germination, weeds are controlled either through weeding or application of herbicides. After clearing the weeds, vegetative herbicides are applied.

Second weeding is done at six weeks ahead of the flowering stage that occurs at between 45 to 50 days after germination. Weeding is discouraged after flowering.

With proper farming practices, yellow beans mature after two and half months compared to other varieties that take about three months. An acre has a capacity of producing between 15 to 18 bags of 90 kilos.

One of the biggest advantages of growing yellow beans is the ready market and each kilo can fetch between Sh75 and Sh120.

Beans

One of the biggest mistakes many yellow bean farmers make is intercropping the crop which affects production.

Intercropping

Farmers are discouraged from intercropping yellow beans with crops like maize as that affects quality. When intercropped with maize, they acquire a whitish colour.

Disease Control

Disease and pest control is also key in bean farming.

Pest and diseases are controlled through spraying failure to which, quality and quantity of production will be affected.

For quality production, farmers are advised to purchase seeds from certified sellers or from the Kenya Agricultural and Livestock Research Organisation (Kalro). However, getting the right seeds is not an assurance for high yields as there are a lot of substandard herbicides and pesticides in the market which water down any other best practice applied by a farmer.

Most farmers have been a victim and the government should put in place necessary measures to cushion farmers against unscrupulous traders who only care about profits.

Another challenge giving farmers sleepless nights, is the changing weather patterns as sometimes it is hard to predict whether the rains will be sufficient or too much for his crop.

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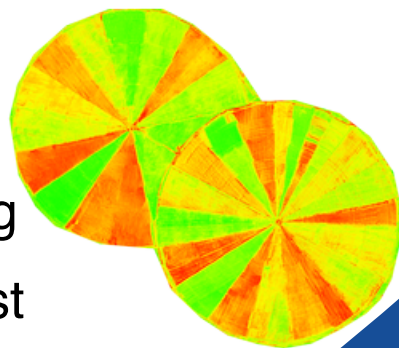
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Fighting the Swarm: An Interview with Dr. Roger Price on Protecting Agriculture from Desert Locusts

There is no debate that the desert locust is one of the most destructive migratory pests in the world. Swarms of desert locusts are so massive that they are measured in kilometers, and a single locust can eat its weight in food in a day. This, coupled with locusts' exponential breeding rates, can lead to unmatched loss of crops and farmland across entire countries, devastating the local communities and threatening food security across the planet.



As of June 2020, much of East Africa was facing a desert locust crisis. The situation is particularly acute in Kenya, Somalia and Ethiopia. To understand the global implications of locust swarms on food security, *CropLife International* spoke with *Dr. Roger Price* of the Plant Protection Research Institute in Pretoria, South Africa.

CropLife: Thank you for agreeing to be interviewed, Dr. Price. Can you please tell us what makes locusts so damaging to agriculture and food security?

Dr. Price: It's the sheer number of insects per swarm, the sheer weight of food that swarms can eat a day, and the unpredictability of their paths—they rise very quickly and in great numbers.

Swarms impact food security because it's difficult to estimate where the locusts are going to come from, and what crops they are going to damage—they eat a very wide range of crops and that impacts especially rural, resource-poor farming areas in East Africa, hitting them very hard.

CropLife:
The

World Bank has reported that this year's outbreak is the biggest outbreak faced by some countries in 70 years. What factors made this year's outbreak so significant?

Dr. Price: To start, warm ocean weather in the Indian Ocean has caused cyclones to hit very dry areas in the Arabian Peninsula in 2018 and 2019, which was followed up by successful breeding of locusts. So it wasn't just one breeding episode—successful breeding over a number of seasons has led to this outbreak.

A lot of these areas are war zones, so monitoring capacity in those areas has dropped or collapsed. On top of that, there had been no locusts for quite a few years, so people weren't actually looking for the locusts. And then the swarms suddenly emerged in January and came into Kenya and Somalia.

COVID-19 has also impacted operations with the lockdown slowing down the delivery of pesticides and spray aircraft allowing some of the swarms to escape to their summer breeding areas.

CropLife: What tools do farmers have available to fight locusts?

Dr. Price: Subsistence farmers

don't have wide access to pesticides or resources to be able to combat the locusts. It's the situation we've been in for the past hundred years—you end up chasing locusts by setting fires or banging drums to chase them away.

You need an early warning system so that you can at least warn the farming communities that locusts are on their way, so they react to those outbreaks and swarms as quickly as possible with whatever resources they have. So mapping where vulnerable crops are, where locusts are likely to be, wind directions, temperatures, all that sort of stuff can help.

But on their own individual farmers don't stand a chance when 20 square kilometers of locusts come and land on their farms. When they get out of control, they take a number of years to get back into recession areas, and usually it's a combination of a vast expense of pesticides and international effort, combined with weather conditions, such as a drought.

CropLife: Can you tell us about the effectiveness of pesticides in controlling locusts?

Dr. Price: The FAO [United Nations Food and Agriculture Organization] only uses pesticides which have been registered

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“ COVID-19 has also impacted operations with the lockdown slowing down the delivery of pesticides and spray aircraft allowing some of the swarms to escape to their summer breeding areas. ”

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and verified by them. The pesticides currently being used have been well-tested and evaluated, and they are efficient. When applied correctly, trials have shown that they can be used at the minimal effective dose.

But we still are using products which a lot of environmentalists are worried about. We've tried alternative methods of locust control. I was involved with the metarhizium production and trials—the fungus against locusts—which works in the laboratory and small trials, but it's not effective when you have to spray it from aircraft. It doesn't work quickly or effectively enough. I did my whole PhD thesis on evaluating alternative methods, but the bottom line is: if you want to kill locusts effectively and quickly, then you still have to resort to broad-spectrum insecticides.

The world is looking for better compounds, more modern compounds—but they're very expensive, and that is a problem. It's a balance between economics and environmental concerns and practicalities.

CropLife: Can you speak about biotech and pesticides, and what role they play in fighting pests and farming in Africa in general?

Dr. Price: Commercial agriculture relies more and more on genetically modified crops because in Africa, it's not easy to grow staple foods without the pest load: farmers all over the place are getting hit hard by the Fall Armyworm; in southern Africa we have the Tuta Absoluta on tomatoes; we've got Maize Lethal Necrosis in east Africa – which are probably coming down here to southern Africa very soon; we've got Citrus Greening. There are all sorts of new pests that are coming into the equation.

It's the subsistence farmers that we are most concerned

about—they are directly in the firing line of new pests and diseases, and that directly influences household food security and local community food security.

In South Africa we plant GM maize, so our farmers are protected at the moment from Fall Armyworm. But subsistence farmers who plant conventional or traditional maize in the rest of sub Saharan Africa who don't have access to GMOs or who don't want to use GMOs are highly susceptible to Fall Armyworm. You have some cases where farmers suffer 80-100% crop losses.

CropLife: How can countries outside of East Africa best prepare to address locust outbreaks?





Dr. Price: In the past hundred years, locusts have infested a vast area: from Portugal to Myanmar, from Uzbekistan to Tanzania. It's very difficult to contain these locusts once they get going. You need concerted efforts from the international community and boosting the local national capacity to survey reports and control locusts. You need to get the farming community involved with early warnings to try and protect crops and determine which crops are vulnerable.

CropLife: **With climate change, do you think we'll be seeing more outbreaks like this regularly going forward?**

Dr. Price: Yes, I think so. Locusts and other pests really do well with climate anomalies. Cyclones in Arabia, drought-breaking rains, and widespread flooding, for example, can all lead to pest outbreaks. So I am sure that these insects respond to climate stimulus, and more unpredictable climate is likely to lead to increasing outbreaks of a range of pests.

I think the international community needs to know or understand that for these millions of farmers in Africa and across the world, it doesn't take much to tip them into a state of financial collapse. Working with these farmers, you realize that millions of people are living on the edge, and more and more of these climate and economic shocks are hitting them hard and making them increasingly vulnerable.

Things like the COVID-19 pandemic and the locust outbreak are very worrying, indeed. The ability to grow food and keep pests away is declining, and most importantly entire communities and livelihoods are at stake as we're not as resilient as we need to be.

In February 2020, the estimated number of locusts in East Africa was already in the hundreds of billions—by

now, the number could be close to 500 times that. Just one square kilometer of locusts can eat as much as 35,000 people. When locust swarms stretch over hundreds of square kilometers—as they do now—they have the potential to impact global food supplies and decimate food security in the communities they infest.

Disclaimer: this interview has been formatted and adapted from its original recording for length and clarity.

Farmers Experience Increased Revenue through Sorghum Farming

As Purity Njeru walks through one of her farm in Tharaka South Sub County, Tunyai Location, Tharaka Nithi County, she points to the bounty of growing sorghum.

“I have practiced farming for several years now, to be precise over 20 years. Farming is what I do for life. It is what I eat, drink and use to raise my children” says Purity.

“Ukulima yangu ilikuwa ya kutamba tamba tu” translated ‘My farming was shaky’ I was forced into farming by the dwindling opportunities which rendered me jobless.” adds Purity

Today, Purity harvests sorghum, green grams and other crops in abundance, and has begun contract farming. Last season, she harvested over 200 bags of sorghum, she is now food secure.

“I could spend Kshs. 15,000 on an acre but now it has reduced to Kshs. 9,000 – 11,000 on a higher side. To this effect, nowadays I don’t take loans to finance my farming venture, I have enough

money to invest to my farm.” explained Purity

Purity attributes her success to what she has learned through the hub.

“In the year 2006, I joined the group. But we were facing several challenges. We lacked quality seeds for our farms and



reliable market for our produce. By virtue of me having been appointed the vice chairperson for my group, I discussed the challenges we were facing with other groups which were also going through the same and we agreed to find help. That is how CGA came into the picture,”

narrates Purity

In 2019, the Cereal Growers Association (CGA) in partnership with Christian Aid established Gakiuma Hub in Tunyai Location, Tharaka Nithi County, near Purity’s home. At the hub, small holder farmers learn to improve production through adoption of climate smart agriculture and good agricultural practices which they are required to replicate at home.

In addition, farmers access advisory services, input and output markets as well as other services such as financial and mechanization services. Purity and over 120 other farmers have been trained as agribusiness advisors (farmer leaders who are change agents at the farm level) and as CSA champions.

“As a farming group in Tharaka Nithi, I can testify CGA has been quite helpful to us. You are God sent. Through your training on various areas which had proved to be a challenge to me, I have managed to increase my yields,” says

“Farmers in Tharaka Nithi County are enjoying the benefits of engaging in good agricultural practices and training undertaken by CGA to enhance productivity and profitability. The skills acquired has enabled most farmers to double their yields and earn handsomely from sorghum farming.”



cows, constructed structures for poultry rearing, fenced my compound, this makes me happy,” says Purity

“I have also supported my husband to buy shopping as he pays school fees for our children. I have children in high school and university,” narrates Purity

Purity is thrilled that her training has helped her increase her production and income that can provide for her family and is now happily giving back to her community by training others on agripreneurship and proper farming skills to increase their production. She is now a mentor to women and members of the community

increased yield. An acre which used to give her 2-3 bags increased to at least 10 bags.

Through 8 CGA supported hubs, small holder farmers like Purity are increasing their production, diversifying their sources of income and becoming self-reliant. Across the four counties namely; Makueni, Kitui, Embu and Tharaka Nithi. These small holder farmers are developing an inclusive, resilient and sustainable green grams and sorghum value chain that improves the livelihoods that are resilient, ensuring food security lasts.

Farmers in Tharaka Nithi County are enjoying the benefits of engaging in good agricultural practices and training undertaken by CGA to enhance productivity and profitability. The skills acquired has enabled most farmers to double their yields and earn handsomely from sorghum farming.

All the 2548 smallholders farmers, like Purity, have received training in planning, production through to harvesting, record keeping, and the use of agricultural inputs to generate maximum yields as well as linkage to aggregation centers and the market.

Adopted From CGA Media Reports

Purity,
“When

I joined the hub, I sat down with other members and discussed on what we should do to grow our farming. I used to harvest 2-3

bags of sorghum from an acre of land and sold it at low prices.

Brokers would come and offer prices which were too low but I had to sell because I needed money.” adds Purity.

Armed with new knowledge and skills from CGA’s training, Purity adopted those ideas and the results she got was amazing. For the first time, she recorded

Before joining the hub, Purity says, “I had no clue on where to get quality seeds, and they were expensive anyway, so I opted for local home-made seeds. But now as a hub beneficiary CGA helped me access fertilizers, certified seeds and better markets where I sold my produce at relatively good prices compared to what brokers offered. Brokers would offer Kshs. 20-25 but through CGA’s market linkage, I started selling at Kshs.37 per kilogram. This change inspired me to work hard and earn more.”

“CGA has transformed my life completely. I never thought sorghum farming is a profitable venture. I did it to keep my land busy, but your intervention has made me realize proper knowledge and skills comes in handy to succeed as a farmer.” said Purity

“I have bought a water tank, dairy

When Farmers Adopt New Techniques, Production Multiplies



Sorghum and Green grams farming is a tradition in Makueni that dates back. Amuka hub from Makueni County in Eastern region Kenya has been growing Sorghum and green grams for many years. But traditional farming practices were not resulting in good yields.

Amuka hub members planted sorghum, green grams and other cereals on their fields, and they did not use fertilizers resulting in scanty harvests. As sorghum and green grams production is a major source of income for families here, profits from sales

were barely covering basic household expenses. This paints a clear picture of the real challenges a Kenyan small holder farmers go through

“Ukulima ulikuwa ngumu. Nilikuwa nalima tu nipate chakula na hata hiyo chakula haikuwa inatoshia,” said Serah Kiema member of Amuka hub. Most farmers were exploited by middlemen/brokers who bought their produce at exorbitantly very low prices which didn't correlate with their expenditure and expected return on

investment.

In 2018, CGA's CVEP began working with the small holder farmers in Makueni to help them improve production and sales. With the support of the project, 68 small holder farmers organized themselves into the Amuka hub. Initial training with the group focused on group dynamics, determining their demand inputs, target markets, good agricultural practices (GAP) and climate smart agriculture (CSA) to enhance agronomic skills and the adoption of climate smart technologies including early planting, use of cover crops, minimum tillage among other CSA practices. Before the onset of the long rains, the



hub received more training on engaging in market intelligence, contract farming and negotiating with the available output buyers, grain quality standards, post-harvest handling and storage, records

keeping, Agripreneurship and financial literacy

“We lacked proper farming skills, used traditional farming method, used poor quality seeds and didn’t have basic knowledge on handling cash. The money gotten from farming was used inappropriately. Our children didn’t go to school due to lack of funds,” explains

Cereal Value Chain Enhancement Project is a partnership project funded by Christian Aid and implemented by Cereal Growers Association (CGA). The project aimed at developing an inclusive, resilient and sustainable green grams and sorghum value chain that improves the livelihoods of small-scale farmers.

Before the training, the hub members could harvest less than 3 bags of sorghum in an acre piece of land. With their newly acquired skills and knowledge, members can now easily produce at least 10 bags in an acre and more. Due to this success, through their savings, the members managed to pull their resources together contributing some amount totaling to Kshs. 260,000 which enabled the group purchase a piece of land. A section of the land has been rented to a church which pays Kshs.4000 per month and the money goes to their kitty. The other section the hub have erected a store which they use to store their produce. Additionally, the hub has established a table banking scheme where members save and borrow money in times of need.

They pulled together Kshs. 300,000 as a revolving fund. Each money borrowed attracts an interest of 5%

of the total money borrowed. The group has also invested in Safaricom shares, built stores and has an operational account with Equity and Kenya Commercial Bank.

Bulk sales have also allowed the hub to negotiate a higher price for their sorghum and green grams with output buyers, improving profits for members. Contractual farming has enabled the farmers to gain easy access to the markets. Through a partnership with Kenya Breweries Limited (KBL), they are able to sell their sorghum at Kshs.37 instead of Kshs. 27.

Today, my harvest has quadrupled, I have savings that benefits my entire family. This is all thanks to CGA’s CVEP, said Daniel, who is a member of the Amuka hub

“We don’t have enough words to thank the CGA, our production has drastically improved, our living conditions are better, and prospects are good,” said Samuel Mbuvi

While many members were skeptical of change in the beginning, more and more members are now applying these news practices.

Through improvements in farming practices, linking to markets and training in business and financial services, 2548 farmers participating in the project made sales totaling over Kshs 8,206,210 through the hubs and a Kshs 867,720 value input sold through the hub. In addition a total of Kshs. 300,000 value of mechanization services done through the hub

Adopted From CGA Media Reports



Plant science can help farmers balance their water use with their production on the farm

Water for Sustainable Growth: How Plant Science is One Solution

Every day, farmers around the world use tools and technology to do more with less. James Rotich is a third generation farmer whose family has farmed the same land in Trans Nzoia since the 1950s. For Rotich and other farmers from Kenya and around the world, water is critical to their production and to ensuring the sustainable farming of their land for years to come.



“For farmers, water represents balance. Not enough and our crops won’t grow. Too much, and they will drown and we will lose nutrients as they flow away,” Rotich says.

Drought and water scarcity, on the rise since the 1970s, put greater stress on farmers to keep up with growing demand for food, fiber, and fuel. One of the tools available that can help them grow more with less is plant biotechnology; It allows them to sustainably protect their natural resources and their livelihoods.

Farmers like Rotich embrace plant

science because it helps them use less water and grow stronger, more drought-tolerant plants. The use of herbicide-resistant biotech crops allows them to adopt conservation tillage or no-till practices, which preserves nutrients in the soil and increases the amount of water the land can store.

“Preserving soil and water resources is key to agricultural sustainability,” Rotich says. “For generations, my family has used the best technology available to preserve the land and water that we depend on.”

From Trans Nzoia to neighbouring nation

of Tanzania, more farmers are looking to change what they plant and how they farm to combat severe drought that results from the extreme changes in weather patterns. Dr. Esther Ngumbi, a research scientist at Auburn University and Kenyan native, believes plant science can help farmers all over the world thrive in the face of adversity.

“As they face a continuous decline of rainfall and recurring

droughts, African farmers will need all the tools and resources they can get to adapt to the effects of climate change,” Ngumbi says. “Biotechnology will continue to play a big role and farmers should be open to considering planting genetically modified crop varieties that have been bred to grow with minimal amounts of water.”

Farmers all face the balancing act of feeding the hungry and caring for the land. The efficient and thoughtful use of water is critical to our farmers’ ability to strike that balance.

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High Bt maize yields impress Kenyan farmers



Kenyan farmers, impressed by the high yields realized in GMO open field trials, are urging the government to speed up the process of allowing them to access Bt maize.

The farmers say the bountiful returns from the Bt maize reminds them of decades long gone when their parents and grandparents used to harvest large amounts of the crop from their fields.

Speaking during a visit to the Kenya Agriculture and Livestock Research Organization (KALRO) National Performance Trial (NPTs) site in Thika, part of the TELA maize project during an exposure learning tour, the farmers expressed their great interest in trying the Bt maize.

The NPTs were planted in October last year and the Thika site demonstrates the performance of Bt maize candidates in comparison with conventional non-Bt and commercial varieties.

The TELA maize project builds on progress made from a decade of breeding work under the Water Efficient maize for Africa (WEMA) project. TELA is derived from the Latin word *tutela*, which means protection or shield. The WEMA project also developed non-GM drought-tolerant hybrid varieties of maize. KALRO is the lead agency on the project in Kenya.

Njeri Kinuthia, a 60-year-old mother of four and a maize farmer in Muranga County who was one of the farmers who visited the site declared during the tour: "When my maize is good, it makes me feel joy. I have learnt that, with my small one acre of land, I can plant maize for my domestic consumption and get a surplus to sell. What has been stopping us is the lack of knowledge that there exists maize variety that slows our challenges. With technology, we can produce more maize and find surplus."

Njeri explains that the scientists' description of how Bt maize is developed from soil-dwelling bacteria corroborates with local farmers' indigenous knowledge of using the soil to tame stem borers.

"My eyes are now open. Initially, I used to hear about GMOs on the radio, but today I have seen real GMOs. I will reach out to more farmers to tell them what I have learnt. I thought GMOs are chemicals that harm people, but today I have seen it is a crop just like any other," Njeri tells Alliance for Science.

"I thought that GMOs are imports from far away, sealed in a paper with some labels on it. But today, I am surprised to see that GMOs can grow in our own soil just like any other maize. What is GM in maize that has grown in our soil?" she asks.

"I am very happy today. For so long, we have grappled with low yields. We did not know that KALRO scientists have developed varieties that address our troubles with persistent pests and diseases. I ask the government to educate more people so that they can see what I have seen because farmers in rural areas are not exposed to the knowledge that there are crops out there with such high yields," Njeri adds.

Jane Wambui, another farmer in Kiambu County who was among the farmers in the Thika KALRO NPTs exposure learning describes Bt maize as "smart, healthy, with strong stems, good yields, and with ears that do not open up quickly to allow toxins such as aflatoxins to spread in the maize."

"Maize has many enemies including the fall armyworm, stem borers, and aflatoxin. Previously we found the fall armyworm on leaves but these days we also find them in the stems and even during harvesting," she observes. "With Bt technology, I don't see such pests. It is not like the current maize crop in my farm discoloured and badly ruined by stem borers. The untruths some people talk about GMOs is a lie, it is just a myth," Wambui adds.

"I could not afford chemicals, which are so expensive and often results in more losses, so I used ash and soil to tame the pests. Thankfully, today I have seen that with Bt



maize, I do not need to use chemicals. I am anxious for the government to allow us to cultivate the crop." "My request is for us to be allowed to access Bt maize before the rains start for the next planting season, hopefully by the beginning of March. If it was available here today, I would have bought the seed to go and plant in my three-acre farm."

Wambui recalls her experiences from poor yields. "We are told to put at least three seeds in one hole so that in case some fail, we may be lucky that one may yield something."

John Kamau from Muranga County says: "I have seen today is that when I will be able to plant Bt maize, it will improve my yields and help me fight pests and diseases." With enough beans and maize, we cannot

"Maize has many enemies including the fall armyworm, stem borers, and aflatoxin. Previously we found the fall armyworm on leaves but these days we also find them in the stems and even during harvesting,"

go hungry, again, and it will also be easier to sell the crop."

James Karanja, the principal investigator of the TELA maize project, says the Kenya Plant Health Inspectorate Service (KEPHIS) is already collecting and analysing the data before making recommendations based on the efficacy of the technology viz the non-Bt and commercial varieties.

KEPHIS will then recommend the variety for commercialization before the Kenya National Biosafety Authority (NBA) grants commercial approval and issue a license allowing seed companies to distribute seeds to farmers.

NPTs will be harvested in March for KEPHIS to present a report in April. Farmers should be able to access the seed by August, says Karanja.

KALRO Senior Principal Research Scientist Dr Murenga Mwimali says in confined field trials, restrictions such as wearing lab coats, gumboots and disinfecting liquids make farmers feel uncomfortable. However, with limited release across the country, the trials are not only in open spaces but also within communities at KALRO centres, making farmers speed up demand.

"I have observed with religious leaders and private sector players that farmers are always packed around Bt maize varieties. This is quite encouraging. The government should give farmers a chance to use the tech to protect their yields from losses from stem borers and fall armyworm," Mwimali says.

"As they see the maize, they want the seed like yesterday. Farmers are very ready. The solution is already here with us." Verenardo Meeme is a science journalist and contributor for the UK-based Science and Development Network.

Copper and Zinc Nutrition in Cereal Production

Copper and zinc are essential micronutrients required in cereal production. Key focus has been on major nutrient with little or no focus on microelements. As per Liebig's law of minimum, if one crop nutrient is missing or deficient, plant growth will be poor, even if the other elements are abundant.



Barrel demonstrating yield potential. The capacity of this barrel is limited by the length of the shortest stave.

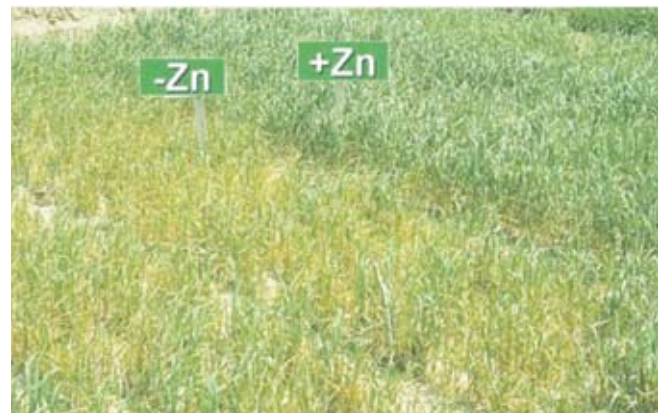
Copper is required for many enzymatic activities in plants and for chlorophyll and seed production. Deficiency of copper can lead to poor pollination, failure of grain formation, increased susceptibility to diseases like Fusarium head blight and ergot.



Wheat spike showing failure of grain formation due to copper deficiency

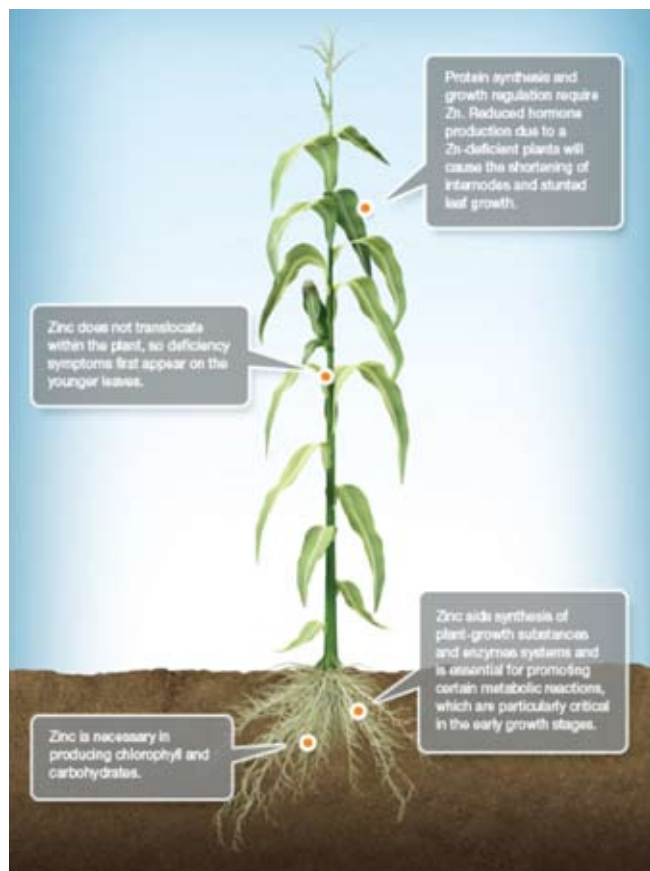
Timothy Munywoki, Senior Agronomist at Amiran Kenya Limited advises that soils developed from pumice and ash from Menengai caldera in Rift Valley (Mau Narok, Nakuru, Njoro, Menengai and Narok) are deficient of copper. According to past copper analysis by *Aspergillus niger*, such soils contain less than 3 ppm copper.

Zinc is essential in the production of many plant enzymes. It is also important in balancing hormone levels in the plant. Zinc is moderately mobile in the plant. In some plants the interveinal mottling appears first on the older leaves and in others it appears on the new leaves first. Zinc deficiencies are common in calcareous soils, intensively cropped soils, sodic and saline soils.



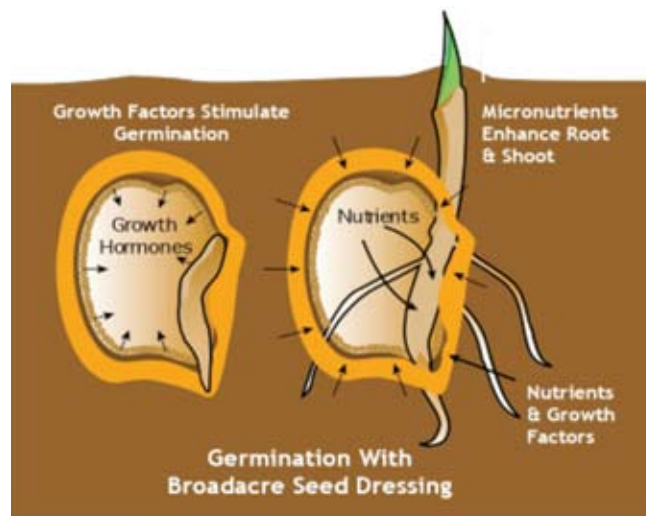
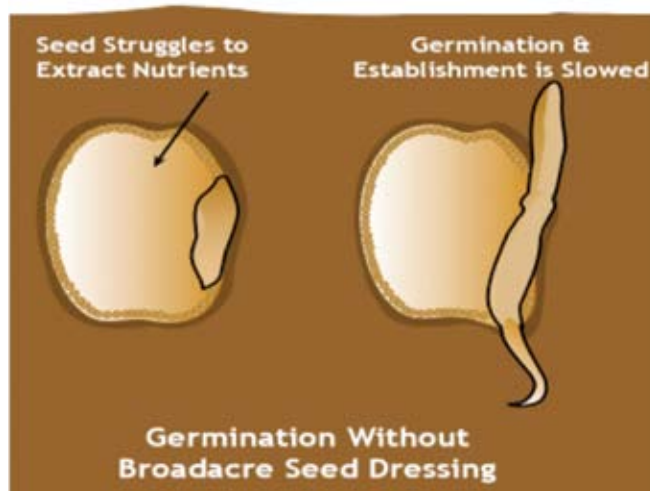
Zinc deficient versus zinc treated wheat field

The following are function of Zinc on maize



Zinc and copper elements are not part of nutritional composition of widely used fertilizers and a few growers end up applying chelates that are quite expensive. Amiran Kenya Limited and Sineria brings Broadhectare®. Broadhectare® contains high analysis of Zinc (60%) and Copper (15%) suspension with germination booster (*Ecklonia maxima* 15%). Broadhectare® may be used for seed treatment or foliar applications.

As a seeds treatment, 4L of Broadhectare® are required to treat 1 Ton of seeds. Effects of Broadhectare® seed treatment are as shown:



Broadhectare® used as seed treatment ensures:

- Accelerated and increased germination percentage.
- Uniform germination.
- Vigorous starter effect.

Foliar application is much ideal for growers who missed seed treatment. The recommended foliar sprays are 0.3L-0.5L/Ha applied at GS 20 – 29 (tillering stage). At this stage, Broadhectare® promotes

- Drought tolerance of the crop.
- Vigorous growth.
- Tillering and leaf area development.
- Photosynthesis and starch formation.
- High yields.

Reasons why cereal farmers should choose Broadhectare®

- High concentration analysis of zinc and copper.
- No phytotoxicity on crops if used as recommended.
- Prolonged uptake by leaves.
- Excellent tank mix compatibility.
- Sun burn / UV protection.
- Low salt index.
- Excellent for aerial application.

Economist Dr. Rabah Arezki says African leaders need to come up with ideas that will make the continent's economy better than it was before the coronavirus pandemic hit.

Since the World Health Organization declared COVID-19 a global pandemic in March 2020, countries, societies, and individuals have struggled to respond to the pandemic's devastation of health systems, economies, trade, and human wellbeing. While Africa has been spared the pandemic's harshest health impacts, it has absorbed a heavy economic burden.

The economic crisis caused by the pandemic has demonstrated the need to rethink Africa's development model, as the world contemplates emerging from the pandemic and aims to build back economies quickly following the current shock—and ensure resilience against future ones.

Africa must do more than get back to normal: it must build back even better, an idea captured in the theme of Africa Economic Conference 2020, Under the theme: Africa beyond COVID-19: Acceleration towards inclusive and sustainable development, the conference, being held 8-10 December and jointly organized by the United Nations Economic Commission for Africa, and the United Nations Development Programme, provides a platform for established and up-and-coming academics to present solution-oriented research to policymakers and decision-makers.

Participants will discuss strategies to fast track economic transformation, including export diversification, digital innovation, and investment in health, water, energy, transport, information, and



Build Africa Back to 'Better'...not Just to 'Normal'

communications infrastructure. Before the onset of the pandemic, Africa enjoyed robust and rising economic growth: 3.4 percent in 2019 and a projected 3.9 percent in 2020. Now, the Bank anticipates recession. Africa's growth is forecast to decline by more than 3 percent, costing Africa up to \$237 billion through 2021.

However, there is variation among African countries. Most resource-intensive and tourism-dependent economies are expected to experience a drop in growth, while non-resource-intensive economies will likely remain steady.

This divergence offers a hint as to the way forward after the pandemic: Africa must diversify its trade exports away from natural resources and commodities, which are vulnerable to price fluctuations, and toward value-added and processed products, and also diversify its trading partners to enhance resilience against demand shocks from commodity importing countries.

To this end, the African Continental Free Trade Area Agreement (AfCFTA) has begun reducing trade barriers between African countries and helped increase the value of intracontinental trade. To fulfill the goals of the AfCFTA,



help formalize informal businesses and make the sector more resilient to future shocks.

As we focus on Africa's post-pandemic recovery, progress toward the United Nations Sustainable Development Goals and the African Union's Agenda 2063 must be guiding stars. Potential tools to achieve this should include: innovative financing for recovery and initiatives to manage emerging risk; putting in place social safety nets and other measures aimed at the most vulnerable; and partnerships to galvanize public and private investments. Other creative solutions are also on the horizon, touching on the green economy, digital disruption, and social contracts.



Even prior to the pandemic, many African countries were fiscally constrained and carrying high debt burdens, with public debt-to-GDP ratios of over 60 percent. As a result, developed economies have been able to pour resources into fiscal stimulus packages to mitigate the health and economic impacts of the crisis while African countries have not.

African countries should implement export-friendly policies and strategies, as well as find new opportunities for diversification, industrialization, and value-chain development that will make trade more inclusive. The private sector and development partners have roles to play too.

A key vulnerability of African economies is the dominance of their informal sectors which, pre-pandemic, accounted for 67 percent of economic output in North Africa and 89 percent in sub-Saharan Africa. As most informal jobs can't be performed from home and don't provide social safety nets, lockdowns have driven poverty and inequality sharply higher.

A critical part of the recovery will be to figure out how policymakers, the private sector, and development partners can

the

Given their tight budgetary constraints and limited access to finance from foreign markets, many African countries have turned to international financial institutions (IFIs), including African Development Bank, as lenders of last resort.

IFI credit has supported health financing and sustained livelihoods during the pandemic.

Looking ahead, these partners must continue to work creatively with African governments, particularly the most fragile states, to find ways to revive economic growth and lessen debt burdens on development.

During the 2020 African Economic Conference we look forward to discussing with researchers and policymakers those innovative solutions and ideas that will bring Africa back even better than before.

The preceding article is the opinion and viewpoint of the author and do not necessarily reflect the opinions and CGTN Africa, its staff or management.

Dr. Rabah Arezki is Chief Economist and Vice-President Economic Governance and Knowledge Management, African Development Bank.

Getting bioenergy from Crop waste instead of burning them

The problem? Burning crop residues. Although it causes a variety of health issues and significantly raises levels of pollution, it is a common practice in India and many other countries around the world. The solution? Turn the crop residues into something useful, such as bioenergy.

The scale of the problem is huge. Around late September and October, farmers in India's Punjab and Haryana, Rajasthan and Uttar Pradesh regions burn an estimated 35 million tonnes of crop waste after harvesting. Without collection, transportation or suitable storage options, burning what's left of the crop is really the only viable option for most farmers. This practice has increased in India in recent years with the use of combine harvesters, machines that harvest grain but discard the straw.

However, burning residues is negatively impacting soils, biodiversity and air. Every winter, pollution levels spike and thick smog hangs over New Delhi. This is largely due to the burning of rice straw, combined with the exhaust fumes from heavy traffic, open fires for cooking or the burning of rubbish to keep warm.

From waste products to clean energy

Rice is one of the most common crops in India, but once the rice grains are removed from the stalks, the rest of the plant is usually discarded – meaning that much of the plant itself is wasted. But these crop residues can actually be used to produce energy and biofuels. The global demand for modern forms of energy, and especially liquid biofuels, is rapidly growing, driven by environmental concerns and fluctuating oil prices.

With the problem expanding, the Government of India turned to FAO, who is now providing technical support for the development of a crop residue supply chain, so that

rice straw can be collected, stored and turned into other products. For example, briquettes and pellets made from rice straw can partially replace coal in thermal power plants. Rice straw can also be used to produce compressed biogas, which could replace natural gas in transport fuel. There is also the potential for ethanol made from rice straw to be blended with petrol. These alternatives give farmers economic incentives to keep from burning the waste and contributes



to the government's aim to double farmers' incomes. FAO is currently assessing the most economically viable forms of bioenergy that can be produced, while also considering the potential to lower



greenhouse gas emissions and reduce the country's reliance on oil imports and coal.

Reaping the benefits

Through its Bioenergy and Food Security (BEFS) approach, FAO provides countries with the guidance, tools and support to implement bioenergy strategies in a sustainable way, with minimal impact on the environment.

Alongside India's NITI Aayog, a central government body coordinating policy development across ministries, and its Ministry of Agriculture and Farmers' Welfare, a team of FAO sustainable energy experts are using the BEFS tools to identify machinery that can harvest,



collect, bail and store crop residues produced in the state of Punjab.

FAO has analysed each stage of the supply chain and carried out surveys in the state of Punjab and Haryana to

hear from the farmers what they think is the best way to remove the crop residues, as well as gauge their interest and expectations from the project.

With an effective business model in place and policy incentives, farmers would be better able to collect and sell residues. With FAO's policy and technical support, the Indian government can explore setting up biogas plants to use the straw and invites private firms to do the same. Government ministries have expressed an interest in producing ethanol, compressed biogas and torrefied pellets as new sources of energy.

"Once the infrastructure is in place, using crop residues for bioenergy can bring economic benefits to the farmers who will be able to sell the straw to the private sector, diversifying their income stream and reducing air pollution at the same time. It is key that we see crop residues not as waste, but as a valuable resource that can be used for several productive purposes," says Manas Puri, FAO's sustainable energy expert leading the team in India.

Tomio Shichiri, FAO Representative in India, explains: "As much as 30 percent of rice residues could be converted into bioenergy and once this is tried and tested in Punjab and Haryana, we could have a model for the rest of India, not only using rice but other crop residues like sugarcane tops."

There is no denying it: sustainable uses of crop residues for clean energy will not only reduce dependence on other carbon sources, but will also mitigate climate impacts, increase farmers' income, reduce health hazards caused by deteriorating air quality and improve soil quality and soil biodiversity, thereby helping the country achieve its Convention on Biological Diversity targets. Clean energy can boost development, whilst protecting our planet and its precious resources. Utilizing waste products such as crop residues can help transform the agriculture sector into an ally for the environment and for farmers who can benefit from new sources of income and energy.



**2023
Declared
As International Year Of Millets
As UN General Assembly Adopts
India-Led Resolution**

The resolution titled 'International Year of Millets 2023' was initiated by India with Bangladesh, Kenya, Nepal, Nigeria, Russia and Senegal and was co-sponsored by over 70 nations.

The UN General Assembly adopted by consensus a resolution sponsored by India and supported by over 70 nations declaring 2023 as the International Year of Millets, aimed at raising awareness about the health benefits of the grain and their suitability for cultivation under changing climatic conditions.

The resolution titled 'International Year of Millets 2023' was initiated by India with Bangladesh, Kenya, Nepal, Nigeria, Russia and Senegal and was co-sponsored by over 70 nations.

The 193-member General Assembly unanimously adopted the resolution, declaring 2023 as the International Year of Millets.

"While millet cultivation has been historically widespread, their production is declining in many countries. There is an urgent need to promote the nutritional and ecological benefit of millets to consumers, producers, and decision-makers, to improve production efficiencies, research, and development investments and food sector linkages," India's Permanent Representative to the UN Ambassador T S Tirumurti said on Wednesday.

Tirumurti underlined that the primary objective of the resolution is to raise awareness and direct policy action to the nutritional and health benefits of millets consumption and their suitability for cultivation under adverse and changing climatic conditions. The adoption of resolution will also draw focus for enhanced investments in research and development and extension services

related to millets, he said.

He expressed confidence that the commemoration of the International Year of Millets will help in creating greater awareness of millet production. It will contribute to food security, nutrition, ensuring livelihoods and incomes of farmers, poverty eradication and the achievement of the Sustainable Development Goals, particularly in regions that are drought prone or threatened by climate change. It will also help promote millets as a key component of the food basket, he added.

India's Permanent Mission to the UN also distributed savoury millet snack "murukku" to all UN Member States. The resolution considers the "urgent need to raise awareness of the climate-resilient and nutritional benefits of millets and to advocate for diversified, balanced and healthy diets through the increased sustainable production and consumption of millets." It also recognises the vast "genetic diversity" of millets and their adaptive capacities to a range of production environments.

UN Member States lauded India for the initiative and its leadership in facilitating negotiations on the resolution.

The Russian Mission to the UN tweeted that it "welcomes the adoption of #UNGA resolution on 'International Year of #Millets 2023'" and thanks #India for this constructive initiative. Millet is one of the oldest crops, it is widely used as one of traditional foods in Russian cuisine."

The Indonesian Mission said in a tweet that it appreciates the leadership of India's Permanent Mission to the UN "in facilitating the negotiation of the 2023 Intl Year of Millets Resolution" and that

Jakarta is pleased to become one of the co-sponsors of the Resolution which is "important to raise awareness on the health benefits of millets consumption." Malaysia's Mission to the UN said in a tweet it was pleased to co-sponsor the UNGA resolutions on the International Year of Millets and congratulated the Indian Mission on the initiative. In April 2016, the UN General Assembly

"the need to promote sustainable food systems that foster diversified, balanced and healthy diets that include a variety of foods."

The resolution invites the Food and Agriculture Organisation of the UN to facilitate the implementation of the International Year.



Millet production contributes to food security, nutrition, ensuring livelihoods and incomes of farmers, poverty eradication and the achievement of the Sustainable Development Goals, particularly in regions that are drought prone or threatened by climate change.

had proclaimed the UN Decade of Action on Nutrition from 2016 to 2025, recognising the need to eradicate hunger and prevent all forms of malnutrition worldwide.

The Decade of Action on Nutrition provides an "umbrella for a wide group of actors to work together to address these and other pressing nutrition issues."

Recalling this, the UNGA resolution on International Year of Millets underscores

How Young Kenyans Feel About Farming Goes Against Conventional Wisdom

Economists and policy makers differ about how they should be absorbed into the labour market. Some experts believe that only agriculture can create enough jobs. Others argue for a focus on the agricultural sector and industrialisation especially with increasing urbanisation. Choosing which policy avenue to follow requires a good understanding of the aspirations of young people.

For our study we spoke to young people from 261 households in rural Kenya. First, we asked them about their preferred livelihood choice using “either-or” questions. This forced them to choose between livelihood options. In this case, only 23% opted for farming.

In a second step, we used a qualitative, narrative-based data collection tool called SenseMaker®. For this, the respondents were asked: Imagine your life in 10 years, tell a story about how you got to that point from this present day?

The respondents were then asked to interpret the meaning of their own stories using a series of questions. One question was how much working time their future-selves spent on farming.

The findings showed that young people typically see farming playing some role in their future, although few respondents want only to farm. Many chose an 80:20 split where they spent around 80% of their work time on farming, and 20% on non-farm activities. Few respondents

opted for the extremes, being full-time farmers or non-farmers. But for those who felt they had high levels of choice, the time spent farming was much less than for those who felt that they had no choice but to farm.

This is important because most rural households are not just farmers. Our research shows that it’s important to go beyond presenting farming as a “take-it-or-leave-it” option – as many researchers and policymakers do. Providing only farming or other careers as options neglects the shades of grey between these two extremes which are likely more important given widespread mixed livelihood strategies. This can undermine the design of appropriate policies.

Mixed livelihoods

Our findings signal that there is scope for mixed livelihood strategies, which combine multiple income streams from on-farm and off-farm sources. The appeal of mixed livelihood strategies is reflected in quotes from some of the rural young Kenyans we interviewed:

A 16-year old male said: I wish to press on with my education and my dream is to become a doctor. From there I will buy a land and engage in livestock farming.

A young female from Turkana said: I want to do business and get some money to help myself. I will also keep animals as a way of supporting my living. The predominant vision of mixed livelihood strategies should not be

surprising since most adult farmers pursue diverse livelihood generating portfolios as well. This seems a sensible choice considering the seasonality and riskiness associated with farming, particularly for those with only small pieces of land – the majority in Africa. Interestingly, most livelihood goals are rural: 49% of youth respondents preferred to remain at their current place of residence, 24% would like to live in the next town and only 17% wished to migrate to the capital. This further calls into question common narratives that see the young people pushing into urban areas.

The results show that the dichotomy between “farm-based” and “off-farm





based” development pathways makes little sense. Both are relevant for their envisioned livelihoods.

Presenting farming as a “take it or leave it” option needs to be revisited to inform rural development strategies based on the actual aspirations of rural youth.

It’s time that agricultural policies and programmes for young people should reflect that youth manoeuvre around mixed livelihood strategies and may utilise linkages between these different livelihood pillars. For instance, money from farming is being used to finance investments into business and vice versa.



Efforts to create meaningful livelihoods for young people are welcomed but such efforts should consider that few young people want to be full-time farmers – but few want to abandon farming completely.

This echoes findings from a study using drawing exercises to understand youth aspirations in Zambia, among others. Rural policies and programmes need to consider that some young people want to be full-time farmers while many others see themselves as part-time farmers, and some want to move out of agriculture altogether. All may require different approaches.

Next steps

Our research challenges the narrative that young people don’t want to be on the land at all. Studies supporting the narrative that rural youth are generally not interested in agriculture abound.

The integration of agricultural and non-agricultural policies will likely be an important step in support of this mix of aspirations.

For example, in Ethiopia, a study found farming was considered a “last resort and, for many, not an option at all.” In Ghana, a study found that young people described farming as a non-modern and physically difficult job for the uneducated.

Like many fairy tales, mine began with a jolt of misfortune

Once upon a time, I was a young dairyman who was living the life of a village bachelor farmer. As glamorous as that might sound, there were significant downsides to this lifestyle. The unhappiest of them was loneliness.

After all, what's the point of successfully chasing the cows back in after they break out if you don't have someone to share the glory with? Or to hold the gate as you gallop through the muck behind your hightailing Holsteins?

I was in town one fateful evening when I bumped into a young lady whom I knew slightly. I invited her to join me for refreshments in a nearby establishment. Shortly after we ordered our beverages, she said that she needed to use the ladies' room.

She got up and walked away and I haven't seen her since.

Dejected by this rejection, I decided to go back home. On my way out of the bar, I stopped to chat with the nice little waitress who had been kind enough to ignore my public humiliation.

That worked out a bit better because we are marking our 40th wedding anniversary.

It's stunning to realize that we've been married for four decades. Both sets of my grandparents made it well past their 50th anniversaries. As a kid, I couldn't imagine anyone living long enough to

be married for half a century. Now that milepost is on the horizon.

Over the course of our marriage, my wife has faced more challenges than a one-armed man climbing El Capitan.

The first one took place on our wedding night. We returned to our farm after the ceremony to discover that our cows had busted out. I instructed my new bride to hold the gate while I chased the cows and to flap her wedding dress if any of them tried to get past her.

"You've got to be kidding!" she retorted and stomped off to the house.

Thus began the pattern of me attempting to foist foolish ideas onto my wife. Due to her boundless font of kindness, she has always forgiven my dunderheadedness. And through it all, my wife has remained my fiercest defender.

A good example of this happened when I was trying to load a bull into a stock trailer so that he could begin his new job at the butchery. I was in a small corral with the bull and was using a pitchfork to try to convince the 2,200-pound brute that he should get into the trailer. My wife, who was pregnant with our second son, watched anxiously from just outside the corral.

The bull abruptly decided that he'd had enough of my nonsense. He put his head down and charged, tossing me high into the air. I somehow managed to land on the wooden corral on my way down. The bull glared up at me, bellowing and pawing. My wife screamed like a

madwoman as she poked the bull with a stick. Realizing that he was dealing with a force much greater than himself, the bull retreated.

That is just a tiny sample of what my wife has put up with over the past 40 years. She has endured such a large number of difficulties that listing them all would consume several square feet of newsprint.

One especially trying time was enduring the mid-1980s Farm Crisis. It's the epitome of financial distress to learn that after years of hard work and sacrifice, you've managed to achieve a negative net worth.

My wife suffered a miscarriage when our eldest son was a toddler. She was so certain that she was carrying a girl that she had begun to buy pink baby clothes at rummage sales. To this day, we might see a young lady of a particular age and think, what if?

I wouldn't be alive were it not for my wife. In 1988, I entered a manure pit on our farm and was overcome by toxic gasses. I was taken to a local hospital where my family was informed that I had zero chance of surviving.

At age 28, my wife was told that she was about to become a widow with two young sons. Her fierceness aroused, she demanded that I be helicoptered to a larger hospital. She made the right call because, well, here I am.

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