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Kenya needs Crop Processing Zones



The secret of the wealth of any nation is clear - process all of what you produce – whether in agriculture, minerals, oil and gas or services – poor nations export their produce as raw materials. Fact, demand for raw commodities is elastic, demand for processed and value-added commodities is relatively inelastic. The price of cotton may decline, but never the price of textile and garments. The price of coffee beans may decline but never the price of brewed specialty coffee.

Kenya needs Crop Processing Zones or CPZs. These zones will be vast areas within rural areas set aside and managed for agribusinesses and food manufacturing industries and other agro-allied industries. They will be enabled with right policies and infrastructure such as roads, energy, irrigation, rail, ICT and ports to help reduce the business costs for food processing and agro-allied industries.

Government will provide fiscal incentives for the food processing and agro-allied industries to move into the CPZs, which, like Export Processing Zones, will be managed by dedicated agencies.

The CPZs will create markets for farmers' produce. Raw materials will no longer be moved out of rural areas, but finished value-added products. Post-harvest losses will also be substantially reduced. And, well-integrated agricultural value chains will develop, with supportive logistics, especially warehousing and cold chains.

Masila Kanyingi

Editor

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Restructuring Of The National Food Reserve And Food Storage Management

Up until 1980 Kenya produced sufficient basic food to feed its population and reaching a surplus of 20% by the mid-1970s. Since then agricultural production has fluctuated year-on-year. At the same time, Kenya has seen sustained high growth in population, nearly a six-times increase since 1963. This compares with 2.2 growth index of staple cereals from 1963 to 2017. The food deficit of maize, rice, Irish potatoes, wheat and sugar continues to widen. By 2017, Kenya's basic food production could regularly feed 72% of the population.

In pursuit of 100 % food and nutrition security, the Ministry of Agriculture,

Livestock, Fisheries and Cooperatives (MoALF&C) developed the Agriculture Sector Transformation and Growth Strategy (ASTGS) 2019-2029. The ASTGS identifies nine flagships critical in addressing systemic bottlenecks constraining Kenya's ability to achieve food and nutrition security. In particular, Flagship 5 proposes restructuring of the Strategic Food Reserve to better serve Kenyans.

Furthermore, the Pillar on Food and Nutrition Security of the Big 4 Agenda sets the production targets which include increasing maize production from 40 to 67 million (90kg) bags; rice production from 112,800 to 406,486 metric tons; meat production from 700,000 to 990,000 metric tons; processed milk production from 630 million to 1 billion litres and fish production from 135,100 to 231,359 metric tons.

Along with the increased production, the Strategy targets to lower post-harvest losses from 20% to 10% and increase

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benefits from value chain efficiency by at least 50%. This will be achieved through improved storage, value addition and trade.

Currently, stocks for the Strategic Food Reserve is handled by the National Cereals and Produce Board (NCPB). In the ideal situation, the Strategic Food Reserve Trust Fund (SFRTF) would buy and sell maize stocks with the aim of creating stability in pricing and stock for the benefit of both producers and traders. The NCPB dominates the grain storage with capacity of 1,841,467 tonnes compared to 173,000 and 58,000 tonnes operated by private sector and other government agencies (Kenya National Trading Cooperation - KNTC and Kenya Farmers Association - KFA) respectively.

On the other hand, the Strategic Food Reserve Trust Fund (SFRTF) was established in 2015 to stabilize the food supply and prices, and maintain adequate strategic food reserves in physical stock or cash equivalent.

Whereas Kenya's approved food reserves includes six (6) food commodities - maize, rice, beans, powdered milk, canned beef and fish, yet maize accounts for 95% of NCPB and SFRTF transactions.

Historically, the Government, through the Strategic Food Reserve has intervened in the maize market, purchasing soon after the harvest, at often higher prices than the prevailing market, store with the NCPB and later release to the market when supplies are depleted, mostly at prices below the market price.

The practice where maize is bought at above market prices

and released at lower than market prices undermines the basic functioning of the food market and sustains manipulation by cartels. This situation disadvantages producers, and undercuts both the commercial and strategic food reserve system. The preferential agency arrangements of SFRTF with NCPB, coupled with blanket government subsidies has out-crowded private sector participation in the food warehousing system.

Moreover, the maize sub-sector has dominated attention and resource allocation in the Ministry of Agriculture, influenced by short term interventions. Consequently, this has drawn attention away from broader and more strategic action for improving Food and Nutrition Security.

This situation is both undesirable and unsustainable.

Four clear options contributing to Food and Nutrition Security.

1. Physical food, cash or voucher transfers to chronically food insecure households.
2. Managing stock volatility in case of glut, shortages or panic through purchase and sale of strategic reserve to the market.
3. Stimulate or orient food production by use of incentives and remunerative returns for farmers,



“The practice where maize is bought at above market prices and released at lower than market prices undermines the basic functioning of the food market and sustains manipulation by cartels. “



4. Increase stable food trade by maintaining predictable range of producer and consumer prices, and thereby to avoid panic or speculative trading.

With regard to assistance to the food insecure persons, and where necessary, the Government sees direct cash transfers as being a more transparent and efficient way to execute support. It provides beneficiaries with the dignity of choice over what to buy and from whom, while enhancing local food trade and value for money by cutting out the middlemen. Otherwise, the identification and delivering assistance to food vulnerable is the realm of the Ministry of Interior and Coordination, Social Protection and the State Department of Devolution, and NOT the Ministry of Agriculture.

In order to address the perennial challenges facing agricultural production and trade, the

Cabinet has directed reforms anchored on among others;

Warehouse Receipt System (WRS) as an open trading platform that links buyers and sellers, and modelled along the stock exchange. Importantly, the Warehouse Receipt System will remove the logistics burden and facilitates producers and

traders to access agricultural credit against the deposit certificate. As you may be aware, the Warehouse Receipting Council has now been appointed and we shall soon be inaugurating the Council and appointing an acting CEO.

Enhanced private sector participation in the agricultural value chain, including storage, thereby creating a competitive food market and the efficiency that comes with it Revamped Food Balance Sheet Committee to oversee accounting and monitoring of the country's food supply pattern, utilisation and distribution.

Institutional reforms to eliminate overlapping roles, conflicts between different government agencies and better respond to changing food demand.

Results

The government will not directly buy, sell maize or set prices of maize

The government will no longer purchase, distribute, sell or set prices of fertiliser, seeds or any farm inputs

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Going forward the government will focus on its key role, that of creating an enabling environment for producers and traders to make and execute commercial decisions, while ensuring that commercial interests, especially on imports do not disadvantage local producers and consumers.

Establish within NCPB the National Food Reserve (NFR) buttressed on commercial processes, the Warehouse Receipt System and targeted incentives directly to registered farmers designed to avoid market distortions and opaqueness.

Institutionalize within NCPB the Food Balance Sheet Committee with broad representation as a statistical and advisory organ on incentives and strategic food reserve decisions making.

To separate the National Food Reserve functions from the commercial ventures, NCPB will restructure to create the NCPB Trading Division (NTD). NTD will operate unencumbered commercial agricultural hub model, clustering registered small-medium holder farmers and agro-dealers around aggregation centres (cooperatives or warehouses) for storage, bulk inputs sourcing, marketing and extension support. Going forward NTD will compete for opportunities on value and price alongside other market players in Kenya.

Other agencies like Kenya National Trading Corporation, Cooperatives and also the private sector will be encouraged and

incentivised to embrace this model, which is key to creating supportive infrastructure for farmers and cutting post-harvest losses. Through this process, the government intends to stimulate growth of 750 farmer facing agro-dealers and equipment suppliers, and 150 storage facilities and processors in 20 agricultural value-chains by 2025

To encourage the early participation of the private sector, and the establishment of



ware receipt housing system, NCPB will release 7 million bags of space through competitive commercial leases. The release of designated storage space to private sector will proceed speedily and completed by December 2020. Finally, starting from September this year, the Agriculture and Food Authority

in collaboration with the counties will undertake the registration of farmers, dealers, and the licensing of primary warehouses, the Warehouse Receipt Council will be responsible for warehouses trading in the Commodity Exchange (KoMEX).

To spearhead the implementation of these reforms, the minister appointed a Technical Working Committee charged

with coordinating prompt and focused implementation of these reforms, and further to ensure that systems are in place to receive produce by October 2020.

In addition, he will invigorate the NCPB Board and inject the required expertise for overseeing the revamped functions of NCPB.

To better ensure that NCPB as an organization execute more effectively and devoid of historical burdens the Technical Committee and NCPB Board will immediately undertake capacity and suitability vetting of all the serving officers.

In the long term will undertake a policy legal review towards the harmonization of mandates of various agencies under the agriculture sector towards enhancing their complementarity.

The Ministry will provide the stakeholders and the public with regular updates on progress.

These measures will be implemented with immediate effect in readiness for the main harvest season in October 2020.

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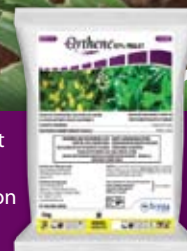
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Why COVID-19 is Another Blow For Kenya's Food Security

By **Miltone Were Ayieko** & **Timothy Njagi Njeru**

Kenya faces one of the most challenging years when it comes to food security. According to the Food and Agricultural Organisation, food security is achieved when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Even before the COVID-19 pandemic knocked on its door, the country faced a devastating desert locust invasion. This added to

constraints posed by excessive rainfall experienced from October 2019. The worst food insecurity that Kenya has faced in recent years was in 2017 and 2008. The food production deficit and food prices were their highest ever in these years.

The Kenya National Bureau of Statistics estimates that about 12 million people are food poor. These are people whose income doesn't enable them to consume enough calories for a healthy lifestyle. Two-thirds of the food poor individuals are found in rural areas.

Kenya relies heavily on maize, wheat, rice and Irish potatoes for food. It is estimated that the country imports about 90% of the total rice demand and about 75% of the total wheat demand. The rest is produced locally. For example, Kenya produces most of the total maize demand itself, importing only about 10%.

A key challenge for the country is to raise productivity in the agriculture sector. This would not only ensure food availability, but potentially lift households out of poverty. To attain this, the country must reduce reliance on rainfed agriculture systems, use modern varieties and technologies by enhancing investments in extension systems, build resilience of farmers against the



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effects of climate change and variability, and improve agricultural market systems and infrastructure.

The coronavirus outbreak adds to the challenge because markets have been closed and delivery of food has been disrupted.

Immediate challenges

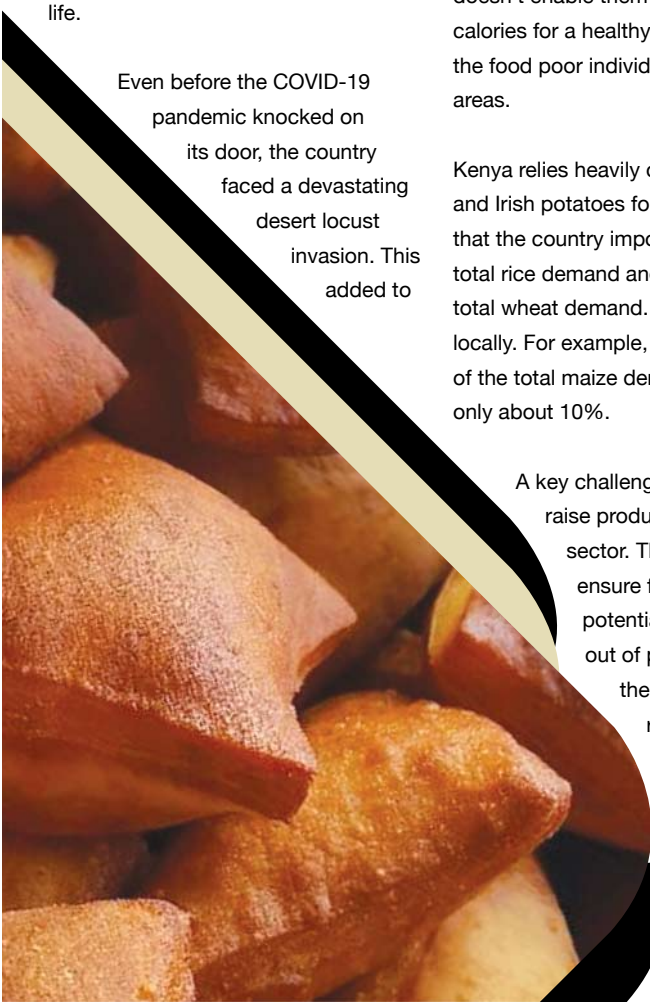
The 2019/2020 season was favourable with most parts of the country receiving above-average rainfall. But above-normal rainfall continued through the harvest period, with adverse effects.

The agriculture ministry now estimates that 10,000 hectares of cropland were destroyed during the long rain season alone. And post-harvest losses are expected to be higher than usual because grain didn't dry adequately in the wet weather.

In December 2019, vast swarms of desert locusts started arriving in the country. By March 2020, the Food and Agriculture Organisation categorised the threat to the country as dangerous, because the locusts continued to breed and form new swarms.

This is the context in which the first case of COVID-19 was announced in March. Administrative measures have included the closure of produce markets and dawn to dusk curfews.

These were highly disruptive for food delivery. This is because Kenya's food



system is heavily dominated by small, independent transporters as the link between producers and consumers. Produce markets, which are at the heart of distribution in urban areas, serve consumers and smaller retailers. This traditional informal system accounts for about 90% of the market.

The closure of many of these markets in the urban and peri-urban areas, while a reasonable measure to avoid crowding, has disrupted food supply systems, especially for fresh produce. The impact is felt most in low-income urban households which rely on these informal food markets.

The same cannot be said for the middle- and higher-income families who can buy fresh produce from supermarkets and grocery shops, which remain open. The ministry of agriculture has now agreed to categorise transport of foodstuff as an essential service, to improve food supply in urban areas. But this is not enough. If produce markets remain closed, supply systems still aren't working fully. About 90% of fresh fruits and vegetables are sold through these markets. A further measure should be to ensure that markets remain open all day, although at reduced capacities.

The long view

There is no doubt that overcrowding must be avoided. But measures must be put in place to ensure that all people can access food.

The local government's measures to close the fresh produce markets are perhaps an admission that it is very difficult to create order in the informal system. But it's not practical to carry on with business as usual.

County governments and the ministry of health should allow produce markets to function. They could have different traders on different days, restrict the numbers of people at the market at any given time and ensure that the safe distancing guidelines are followed. Enforcement would come at a cost, but the benefits would be better access and less panic.

The other key question is the adequacy of stocks available in the country. The planting for the long rain season is under way. The ministry has sustained measures already put in place to control desert locusts which now are a threat to the new crop. Farmers also need access to inputs to ensure optimal production.

The ministry has also announced plans to import maize, about 4 million bags, following its food security committee's assessment that the current stocks can last up to the end of April. The imported volumes represent slightly above a month's cover, which is estimated at about 3 million bags.

Earlier planning for imports is commendable, especially since the pandemic has also disrupted global food supply systems. The ministry should step up monitoring of stock, prices and distribution systems to ensure that the government can step in where the market mechanisms fail.

The pressure of the COVID-19 pandemic will be felt even after the pandemic has been contained. Economists have already predicted a global economic downturn in 2020. Availability and affordability of food will remain a top priority for all countries.

Kenya must ensure that adequate safety nets will be in place for food security for households that will be devastated economically. At the same time it must continue providing support to producers to improve supply as far as possible.



Unlocking Kenya's Sorghum Potential to Create Wealth

Africa is the centre of origin and also a major producer of several cereals like sorghum, pearl millet, finger millet, teff and African rice.



Agriculture is the 'engine for growth' in Kenya. With subsistence agriculture practiced by majority of small holder farmers, yield gaps are high and poor soils, amongst other constraints add to the difficulties for sustainable farming and incomes. Cereals like Sorghum, Millets, Wheat, Maize and Rice are major staple foods of the most population. Sorghum is among the most important cereal crops in the country.

Sorghum yields per acre in Kenya is lower than half the world average. The average fertilizer (N + P₂O₅) consumption is 1/6th compared to the world consumption. Increasing productivity of the small holder farmers, bridging the yield gaps by providing appropriate inputs along with improved technologies such as stress resistant and high yielding varieties and empowering farmers to better manage climate risk will be a huge step towards agricultural transformation in Kenya.

The primary demand for sorghum is for food, especially in the

dryland regions where these are the principal crops. This continuing demand is reflected in the trend for increasing area under sorghum over the last few years but crop productivity has not kept pace with this increasing demand. This is due to both a lag in crop improvement efforts in these crops and the extreme environmental conditions and the low input agriculture under which these crops are grown. Thus it is immediately evident that crop improvement efforts combined with improved agronomic practices is a must for these crop, especially in view of the reducing arability of land.

Researchers have come up with some interventions. A number of initiatives are currently ongoing that present good opportunity for the current process to tap from.

These initiatives have led to significant achievements with the release of high yielding improved sorghum varieties adaptable across the target countries and agroecologies.

Demand

The continuing demand is reflected in the trend for increasing area under sorghum over the last few years. Unfortunately however, crop productivity has not kept pace with increasing

demand, due mainly to a lag in crop improvement efforts in sorghum, relative to other cereals, and the extreme environmental conditions and resource constrained, low-input farming systems where these crops are grown.

Furthermore, in such dryland environments, the issues of climate variability, change and land degradation are acute with a lack of progress the result of neglect, remoteness and weak national institutions. Despite these factors there is a strong case for stepping up the efforts towards development of technologies (germplasm improvement, agronomic management), markets and institutions to advance the case for sorghum in the dryland tropics of Africa.

Challenges

Kenya faces a wide range of challenges in the production of the five major cereals considered in this Work Stream - rice, maize, millet, sorghum and wheat. Key among these challenges are:

The impact of climate change: Global agriculture is facing the probable impact of global warming. Recent studies suggest that the production of major commodities has declined since 1980 due to global warming. It is estimated that, given current warming trends in sub-Saharan Africa, the production of major cereals could decline by as large as 20% by mid-century. The poor who depend on agriculture for their livelihoods and are less able to adapt will be disproportionately affected.

Land degradation and persistent biotic and abiotic stresses: In addition to inherently high climate variability, the looming threat of higher temperatures and more vicious droughts (arising from climate change) is a major concern. Further, high incidences of diseases, insect-pests, and parasitic plants, and sub-optimal soil nitrogen have also presented a continuous challenge to cereal productivity.

Rapid population growth across Africa and associated difficulty in meeting the projected demand for food: The high population growth in Africa is giving rise to rapidly increasing demand for food. The UN's Human Development Indices suggest that the dryland areas remain among the poorest and most food-insecure places in the world.

Poor mechanization: The low level of mechanization in agriculture

has continued to serve as a huge impediment towards advancing cereal production, especially of wheat and rice which, in turn, results in the high cost of producing these crops.

Inadequate or weak policy environment: Most government policies are inappropriate and inconsistent, and do not provide an enabling environment for the development of the cereal sector in Africa. This includes low funding of the national agricultural research and extension institutions, leading to ineffective technology development and diffusion mechanisms. Lack of investment in infrastructure such as roads, storage and market facilities handicaps the potential role of the private sector.

Dwindling financial resources for Research and Development: There has been a steady decline in the level of financial support by the major donors to agricultural research. Many financial institutions have had to cut back their financial allocations to these cereals.

The Way Forward

Taking into account the challenges that face the production of sorghum and the opportunities that exist for their development and expansion, it is envisaged that the following pragmatic approaches will have the potential for increasing productivity, creating impact and improving the livelihood of smallholder farmers:

- **Strengthen the Crop Development Process:** Maintain and strengthen the development of new, well-adapted sorghum cultivars with high yield potential and the genetic capacity to withstand major biotic and abiotic stresses. There is need to continue the breeding efforts, and to seek to strengthen the institutions in the use of modern breeding platforms and methodologies.

The breeding research carried out as part of past and current efforts should enable institutions to provide appropriate gender-responsive cultivars that meet the needs of farmers and processors in targeted agro-ecologies. Implementation of these programs should lead to fundamental improvements in program efficiency by promoting improved operational practices and the uptake of modern breeding approaches, as well as much improved information management practices. Breeding plans should be developed and implemented based on the strengths and program gaps identified using the Foundation sponsored Breeding Program Assessment Tool (BPAT).

- **Strengthen seed production and delivery systems for improved varieties:** Improving the efficiency and



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effectiveness of seed production and delivery systems is critical for enabling the uptake of improved cultivars by smallholder farmers. This is the basis for increased productivity in the semi-arid areas of the target countries, it will lead to availability of nutritious food for a majority of the population especially for children under the age of five years. Increased systems efficiency will make improved seed more affordable, and greater effectiveness will help ensure that quality standards are met and maintained. In partnership with a functional private sector and community based farmers organizations, the seed of improved cultivars and associated inputs will be made available at outlets closer to farmers.

• **Expedite the scaling out of new sorghum technologies including products development:**

This component should focus on raising awareness of new technologies, both with farmers and with those with mandate and/or

incentive to provide farmers with access to technologies. Stimulated demand from farmers will create market opportunities for suppliers, particularly for improved seed and input services. Linkage should be formed with initiatives that are developing sustainable models of seed supply which supports private seed companies and village based agro-dealers. This linkage is essential to ensure that the demand for improved seed created by various initiatives will continue to be met in a sustainable manner. Scaling-out efforts should aim at making sorghum growers in the target regions aware of new technologies, while also allowing farmers to test new varieties and associated best management practices for themselves. They should also leverage current and emerging interest from those service providers (Community, NGO and private sector especially flour mills for composite with wheat) looking to service the smallholder farming sector.

Similarly it is important to develop sorghum products for the urban market, since this will encourage commercialisation of the crops.

• **Enabling Farmers' access to production inputs and markets:**

A valid theory of change is that resource-poor smallholder farmers will adopt improved sorghum technologies if they are relevant and made available, accessible and can be utilized, and that they have access to reliable markets to dispose of surplus production. Demand for productivity-enhancing inputs – seed and fertilizer – is largely derived from the product market. Existing use of improved inputs by smallholder farmers is limited both by inconsistent external demand on the output side, and lack of capacity to supply improved seed, fertilizer, finance, and know-how on the supply side. Efforts should be made to enable farmers to access both the inputs needed for production, and the markets for disposing of surplus farm produce.

• **Strengthen and sustain the technology delivery system:**

The agricultural extension services are weak, at best, or non-existent. There have been many donor-inspired efforts to revamp agricultural extension, and the outcome has been discouraging, mainly

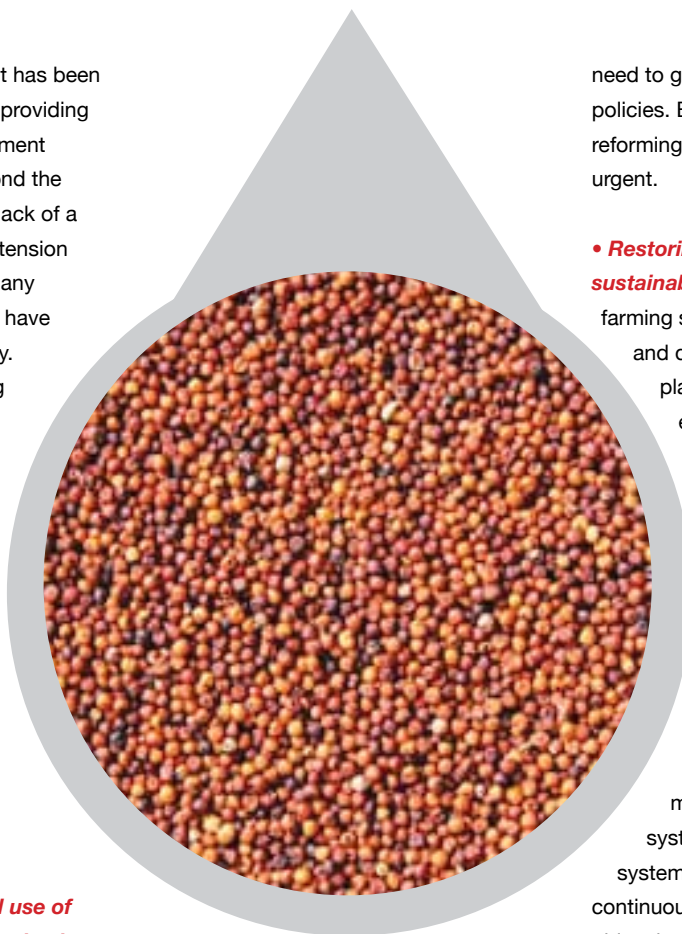
because the national government has been unable to match donor efforts in providing adequate resources and commitment to keep the system running beyond the lifetime of the donor funds. This lack of a strong, centrally- coordinated extension service has created a gap that many Farmer organizations and NGOs have tended to fill, to degrees that vary. There is need to formulate strong technology delivery programs and systems that ensure timely, accurate and location-specific information required by smallholder farmers for their decision-making process. Digital tools, such as the use of mobile phones and short text message (sms) are helping to bridge this gap in some countries. But a lot more still need to be done to reach remote farmers.

• **Mechanization: Adoption and use of small and medium scale Mechanization:**

The participatory evaluation and dissemination of machines and tools for mechanization of small and medium scale production and processing to increase productivity, reduce drudgery among women and youth will be given high priority. These operations will also be used to increase job and income generation among youths and women as well as increase quality of postharvest grains and products.

• **Review of relevant agricultural policies:**

The policies governing many aspects that are central to agricultural production are in need of serious review. These include such critical aspects as seed certification, production and distribution, land ownership or tenure, gender relations and the rights of women to own property. Because some of these aspects have cultural roots, changing them is a slow long process which would



need to go beyond mere changing of the policies. But it is clear that efforts towards reforming such aspects are necessary and urgent.

• **Restoring degraded soils and ensuring sustainability:** In the sorghum based farming systems, soils are widely degraded and depleted of organic matter and plant nutrients. There is need to empower farmers to enable them manage their natural resource base in a sustainable manner using integrated soil fertility and, crop rotation (e.g. Cash crops like cotton can play an important role in the rotation in these systems in terms of residual Phosphorus (P) and Nitrogen (N) for the legume and cereal crops, respectively), minimum or conservation tillage systems. There is need for extension systems that enable farmers to continuously learn new ways of performing old tasks, as well as new tasks, to increase their production while sustaining the environment and their lands productive capacity.



Recent studies suggest that the production of major commodities has declined since 1980 due to global warming. It is estimated that, given current warming trends in sub-Saharan Africa, the production of major cereals could decline by as large as 20% by mid-century.

The poor who depend on agriculture for their livelihoods and are less able to adapt will be disproportionately affected.”

• **Understanding farm livelihoods and the potential impacts of interventions:**

Farm households are highly heterogeneous entities, with multiple constraints of labour, capital and access to resources and operating in highly climatically variable environments. The use of systems analysis, encompassing the biophysical and socio-economic makeup of farm households are methodologies that use redeployable computer based modelling tools that can capture some of these complexities. Such methodologies, applied participatively with farmers and stakeholders create robust intervention strategies which more effectively lead smallholders out of poverty.

How Incoherent Farm Policies Undermine Kenya's Transformation Agenda

A key objective of Kenya's agriculture growth and transformation strategy and the Big Four Agenda is increasing smallholder productivity and incomes. The strategies also aim to enhance value-addition and agro-processing, which could create employment in agricultural value chains. The overall goal is to transform rural economies into commercially viable concerns.

But the government sometimes pursues policies that undermine these objectives. Sorghum farming is a case in point. In Kenya, sorghum is mainly grown in areas characterised by low rainfall and high temperatures. For decades, there was little incentive to grow the crop because production costs were high, market integration low, and yields consistently low at about 0.7 tons per hectare. Ethiopia has consistently attained a national yield of 2.5 tons/ha. Farmers were unable to break even. Production was mainly for domestic consumption.

But thanks to the government policy supporting the use of sorghum for commercial beer brewing in 2004, through waiver of the excise duty, demand for sorghum increased, giving smallholder farmers an opportunity to transform their agriculture and livelihoods.

First, sorghum beer processing provided a stable market. Contracts entered between



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the main brewer and farmers guaranteed farmers a market and stable prices. Farmers responded by increasing their production. Some attained up to 3.3 tons/ha, which translated to an increase in incomes of about 220%.

Contract farming for sorghum beer processing expanded from three counties in 2010 to the current ten counties, with four more in the pipeline. During this period, the number of farmers has grown from 2,300 to 48,000 and farm-gate price per kilogram from 23 to 37 KES. Yield has improved due to better agronomic services and inputs provided on credit by the industry.

Second, researchers have been given an incentive to support the industry and responded by doubling the number of improved varieties from 20 in 2012 to 40 in 2017. These improved varieties are higher yielding, drought tolerant, pest and disease resistant and tailored for specific soils, rainfall and temperature.

Third, the policies on flour blending provide additional uses for sorghum in agro-



processing. Despite this growth, Kenya remains a net importer of sorghum. But the sorghum value chain, which is now years in the making, faces severe disruption. The National Treasury now seeks to reduce the excise duty waiver for beer made from locally grown sorghum, millet or cassava or any other agricultural produce from 80% to 60%. This measure is of course intended to increase tax revenue for the government.

But this policy will likely result in increased prices for the end consumers. This will in turn force the processor to cut down on production, and thereby reduce demand for the raw material. It is important to note that the main objective of changing the policy in 2004 was to fight illicit brews by making sorghum beer more affordable for people with low incomes.

Reduced demand will not only lower



sorghum prices but increase costs for farmers forced to invest in storage and management of unsold produce. And more jobs will be lost along the value chain as economic activity scales down.

Learning from past policy failures

Existing evidence shows that such a policy move is counterproductive. In 2013, a similar proposal was implemented when a 50% excise duty was introduced.

As a result, the price of sorghum beer increased as the added tax was passed on to consumers. The demand for sorghum plummeted as the beer processors scaled down processed volumes and also cancelled contracts for farmers.

This had a negative impact not only for farmers, but for others in the value chain, like input sellers, grain aggregators and transporters. Instead of the government raising revenue, it actually lost Ksh 2 billion in forgone tax revenue due to losses accruing to the sorghum beer processors and others in the chain.

The policy measure was rescinded in 2015.

The new regulation is ill-timed. This year, the agriculture sector has suffered several shocks. From December 2019, the desert locust invasion affected most of the arid and semi-arid lands. Also, excessive rainfall has been experienced in most parts of the country. Although the former did not pose a severe

threat to sorghum farming, the latter posed a significant threat to productivity arising from flooding and waterlogging.

The COVID-19 pandemic has disrupted the economy in a way never experienced before. The demand for sorghum beer was

already depressed following the closure of bars, restaurants and hotels in March 2020. Curtailing the industry during such economic shocks can only lead to worse effects for the economy.

Inconsistent policy choices

The adverse policy also contradicts other government's policies and investments. The government, through support from development partners such as the World Bank and European Union, has also invested heavily in the sorghum and millet value chains through the projects like Kenya Climate Smart Agriculture Project, the National Agricultural and Rural Inclusive Growth Project and the Kenya Cereal Enhancement Programme. Several counties have prioritised sorghum as an essential food and commercial crop.

The president opened a Ksh 14 billion plant in Kisumu County two years ago which is serving as a key market for farmers in the western region. Another processing plant is being set up in Nakuru County. These investments have been made as a result of a stable and predictable policy environment that has existed in the past.

Across the value chain various players have invested and continue to do so with the expectation that this environment will persist and guarantee them a return on their investments. These actors include seed breeders working on sorghum varieties, seed companies, grain processors and investments in post-harvest storage and management.

The proposed regulation will be a disincentive to such investments, especially by the private sector, and possibly lead to capital flight.



Types of Fertilizers and their Deficiency Symptoms in Maize

A healthy maize crop has dark green leaves. Any yellow colours on your maize crop is a sign that your crop has low nitrogen. To correct this, apply Urea using the right rates as



advised by a soil test or a leaf analysis test which can be done at affordable costs in agricultural labs in the country.

Fertilizers can be broadly classified by application method and by nutrients found in the fertilizer. The classification can vary based on:

Application method

This method classifies fertilizers through the different methods it is applied in the farm. Under this there are foliar fertilizers that are applied by spraying the leaves.

Modern foliar fertilizers are liquid fertilizers that are highly concentrated with the required nutrients.

Nutrients

This classification looks into the number of nutrients available in the fertilizer and sometimes the type of the primary macronutrient. Under this class we have Single nutrient fertilizers also known as straight fertilizers and Compound fertilizers or multi-nutrient fertilizers.

Single fertilizers

This class is further sub-divided based on the primary macro nutrient in the fertilizer. Macronutrients are essential nutrients used in large quantities by the plants for proper growth. Major subdivisions are nitrogen, phosphate and potassium fertilizer as the three primary macro nutrients.

Nitrogen fertilizer

As the name indicates, this group contains nitrogen only. The percentage of nitrogen in the fertilizer differs based on the manufacturer and form like ammonia, urea or nitrate. Examples of this fertilizers include urea and C.A.N. For maize production, nitrogenous fertilizers are important as they help in production of food for the maize plant which we in turn harvest.

It helps the leaves of the maize crop remain green for the maize to be able to make food. A healthy maize crop has dark green leaves. Any yellow colours on your maize crop is a sign that your crop has low nitrogen. To correct this, apply Urea using the right rates as advised by a soil test or a leaf analysis test which can be done at affordable costs in agricultural labs in the country.

Phosphate fertilizer

This class contains phosphorous as the main macronutrient. Examples of this would be Monoammonium Phosphate (MAP), Single Superphosphate (SSP), Double Superphosphate (DSP) and Triple Superphosphate (TSP). In this category some farmers use a



rock that is rich in phosphorous. Phosphorus in maize product is applied during planting as it is important in root formation and crop establishment. DAP is preferred as it releases the phosphorous slowly and also contains nitrogen. Maize plants with reddish colour on the tips of the leaves indicate phosphorous deficiency.

Potassium fertilizer

Potassium is important when it comes to the formation of the maize seeds and cobs. To avoid gaps, thin seeds and cobs, potassium is a key. Deficiency of this nutrient is similar to nitrogen deficiency where leaves yellow. The way to differentiate this is to closely inspect your crop. When yellowing starts with the bottom older leaves only, the plant lacks potassium.

Compound fertilizers

This category of fertilizers contains more than one primary macronutrient sometimes some manufacturers add trace nutrients. Trace nutrients are the nutrients that are used by the plant in small amounts such as Zinc, Boron, Copper among others.

Compound fertilizer example include NPK which contains all primary macronutrients that is Nitrogen (N), Phosphorous (P) and Potassium (K) either in equal ratios like 15:15:15 or have a higher nitrogen percentage 16:8:8. A fertilizer with all three macronutrients is sometimes called a complete fertilizer.

Compound fertilizers also includes fertilizer with two macronutrients like 18-46-0 (diammonium phosphate).

Farmers should always perform soil tests to understand the condition of their soils before application of any fertilizers. Use fertilizers wisely to avoid pollution.

Choosing the right fungicide

By Henry Kinyua



It is important to note that when using both fungicides and insecticides, it's advisable to use them wisely to manage resistance. This can be achieved by avoiding the use of one active ingredient repeatedly or tank mixing chemicals with one active ingredient. Also, it's important to avoid underdosing.”

T

oday there are very many chemicals in the market and farmers are finding it hard to choose which chemical to use.

Plant protection chemicals can be classified into three categories; fungicides, Herbicides and Insecticides/Miticides/Nematicides.

Fungicides

These are either disease protectant or curative. Curative fungicides are applied to crops when a disease has been spotted while protectants are applied prophylactically as a control measure.

Curative fungicides are usually systemic and are applied when a specific disease has been spotted or there is a presence of disease-causing spores in the neighbours' crops. They are also applied in the presence of predisposing factors, e.g., high humidity which may trigger downy mildew in vulnerable crops.

So a decision to use a curative chemical may be made if there's:

- Presence of a disease
- Presence of a disease in a neighbour's farm
- Presence of factors which favour the growth or spread of a specific disease, e.g., rain or high humidity.

For a disease to attack a plant or develop in a plant, there must be a source of infection. This refers to disease-causing organisms or pathogens and conducive weather factors which favour that particular pathogen. It's not possible to see the pathogens with the naked eye. This is why it's always important to take measures to protect your crops by spraying or using protectant fungicides as a regular program (Prophylactic spray program).

Protectants

These are mainly contact fungicides which are used in a regular spray program to give the crop a protective cover against disease. These chemicals are very useful because the majority of protectants are multi-site, that is, they attack many sites within the pathogen cell (curatives are single site). Due to this, they don't develop resistance easily like curatives.

Examples of Chemicals in this category include Mancozeb, Coppers, Propineb and Chlorothalonil.

Mancozeb, Chlorothalonil, and Propineb are good for controlling numerous diseases BUT it's always important to read the label before use.

It is important to note that when using both fungicides and insecticides, it's advisable to use them wisely to manage resistance. This can be achieved by avoiding the use of one active ingredient repeatedly or tank mixing chemicals with one active ingredient. Also, it's important to avoid underdosing.

What is an active ingredient? This is a component in a chemical which has the ability to kill a pathogen or an insect and it's always expressed as a % by weight or volume of the content in a litre /kg. These days, there are several brand names sharing a similar active ingredient and if one is not careful it is possible to buy and spray using chemicals bearing many brand names but only one active ingredient.

Product label

Everything that a farmer would like to know about a chemical is written on the label. The label has very useful information and farmers should always read the label before using any chemical. The label has the disease name which the chemical is used against, the dosage rate, the pre-harvest interval, the volume of water to be used, the spray intervals and tank mixing recommendations.

Pre-harvest Interval (PHI)

The Pre-harvest interval is the period between the spraying date and the harvest date. This is the period the farmer must wait before harvesting the crop after spraying with chemicals. Chemicals are poisons, i.e., they can harm human beings if not properly used. Due to this fact, chemical manufacturers are required by law to state the period by which the chemical residues are at their lowest in a plant from the date of spraying.

Some chemicals persist more than others, that is, they take longer to be broken down within the plant system or on the surface and that's why different products have different PHIs. Farmers must observe recommended PHIs to enhance food safety and avoid feeding fellow human beings with chemicals.

Some countries are very strict about the safe use of pesticides as a way of protecting the environment, aquatic life, spray operators and consumers against pesticides. This is why MRLs (Maximum Residue Levels) are set. MRLs are not safety measures but are measures or indicators of good agricultural practices. Consuming plant products with higher MRLs once doesn't necessarily mean that one's health is at risk but continuous consumption of such products may pose a health risk due to accumulated residues.

Poor use of pesticides or failure to read the label may be hazardous to the person spraying. It may poison the water if knapsack sprayers or empty containers are washed in the rivers. All these hazards can be avoided by simply reading the label.



Why Cereals Matter: The Cereals Imperative of Future

The world urgently needs a transformation of the global food system, leading to healthier diets for all and a drastic reduction in agriculture's environmental impact. The major cereal grains must play a central role in this new revolution for the benefit of the world's poorest people.

By Martin Kropff and Matthew Morell

Pioneering research on our three most important cereal grains — maize, rice, and wheat — has contributed enormously to global food security over the last half century, chiefly by boosting the yields of these crops and by making them more resilient in the face of drought, flood, pests and diseases. But with more than 800 million people still living in chronic hunger and many more suffering from inadequate diets, much remains to be done. The challenges are complicated by climate change, rampant degradation of the ecosystems that sustain food production, rapid population growth and unequal access to resources that are vital for improved livelihoods.

In recent years, a consensus has emerged among agricultural researchers and development experts around the need to transform global food systems, so they can provide healthy diets while drastically reducing negative environmental impacts. Certainly, this is a central aim of CGIAR — the world's largest global agricultural research network — which views enhanced nutrition and sustainability as essential for achieving the Sustainable Development Goals. CGIAR scientists and their many partners contribute by developing technological and social innovations for the world's key crop production systems, with a sharp focus on reducing hunger and poverty in low- and middle-income countries of Africa, Asia and Latin America.

The importance of transforming food systems is also the message of the influential EAT-Lancet Commission report,



launched in early 2019. Based on the views of 37 leading experts from diverse research disciplines, the report defines specific actions to achieve a “planetary health diet,” which enhances human nutrition and keeps the resource use of food systems within planetary boundaries. While including all food groups — grains, roots and tubers, pulses, vegetables, fruits, tree nuts, meat, fish, and dairy products — this diet reflects important shifts in their consumption. The major cereals, for example, would supply about one-third of the required calories but with increased emphasis on whole grains to curb the negative health effects of cheap and abundant supplies of refined cereals.

This proportion of calories corresponds roughly to the proportion of its funding that CGIAR currently invests in the major cereals. These crops are already vital in diets, cultures, and economies across the

Food Systems

developing world, and the way they are produced, processed and consumed must be a central focus of global efforts to transform food systems. There are four main reasons for this imperative.



1. Scale and economic importance

The sheer extent of major cereal production and its enormous value, especially for the poor, account in large part for the critical importance of these crops in global food systems. According to 2017 figures, maize is grown on 197 million hectares and rice on more than 167 million hectares, mainly in Asia and Africa. Wheat covers 218 million hectares, an area larger than France, Germany,

Italy, Spain and the UK combined.

The total annual harvest of these crops amounts to about 2.5 billion tons of grain.

Worldwide production had an estimated annual value averaging more than \$500 billion in 2014-2016. The prices of the major cereals are especially important for poor consumers. In recent years, the rising cost of bread, as well as the rice price crisis in Southeast Asia, imposed great hardship on urban populations in particular, triggering major demonstrations and social unrest. To avoid such troubles by reducing dependence on cereal imports, many countries have made staple crop self-sufficiency a central element of national agriculture policy.

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2. Critical role in human diets

Cereals have a significant role to play in food system transformation because of their vital importance in human diets. In developing countries, maize, rice, and wheat together provide 48% of the total calories and 42% of the total protein. In every developing region except Latin America, cereals provide people with more protein than meat, fish, milk and eggs combined, making them an important protein source for over half the world's population.

Yellow maize, a key source of livestock feed, also contributes indirectly to more protein-rich diets, as does animal fodder derived from cereal crop residues. As consumption of meat, fish and dairy products continues to expand in the developing world,

demand for cereals for food and feed must rise, increasing the pressure to optimize cereal production.

In addition to supplying starch and protein, the cereals serve as a rich source of dietary fiber and nutrients. CGIAR research has documented the important contribution of wheat to healthy diets, linking the crop to reduced risk of type 2 diabetes, cardiovascular disease, and colorectal cancer. The nutritional value of brown rice compared to white rice is also well known. Moreover, the recent discovery of certain genetic traits in milled rice has created the opportunity to breed varieties that show a low glycemic index without compromising grain quality.

3. Encouraging progress toward better nutritional quality

The major cereals have undergone further improvement in nutritional quality during recent years through a crop breeding approach called “biofortification,” which boosts the content of essential vitamins or micronutrients. Dietary deficiencies of this kind harm children's physical and cognitive development, and leave them more vulnerable to disease.

Sometimes called “hidden hunger,” this condition is believed to cause about one-third of the 3.1 million annual child deaths attributed to malnutrition. Diverse diets are the preferred remedy, but the world's poorest consumers often cannot afford more nutritious foods. The problem is especially acute for women and adolescent girls, who have unequal access to food, healthcare and resources.

It will take many years of focused effort before diverse diets become a reality in the lives of the people who need them most. Diversified farming systems such as rice-fish rotations that improve nutritional value, livelihoods and resilience are a step in that direction. In the meantime, “biofortified” cereal and other crop varieties developed by CGIAR help address hidden hunger by providing higher levels of zinc, iron and provitamin A carotenoids as well as better protein quality. Farmers in many developing countries are already growing these varieties.

A 2018 study in India found that young children who ate zinc-biofortified wheat in flatbread or porridge became ill less frequently. Other studies have shown that consumption of provitamin A maize improves the body's total stores of this vitamin as effectively as vitamin supplementation. Biofortified crop varieties are not a substitute for food fortification (adding micronutrients and vitamins during industrial food processing). But these varieties can offer an immediate solution to hidden hunger for the many subsistence farmers and other rural consumers who depend on locally produced foods and lack access to fortified products.

4. Wide scope for more sustainable production

Cereal crops show much potential not only for enhancing human health but that of the environment



as well. Compared to other crops, the production of cereals has relatively low environmental impact, as noted in the EAT-Lancet report. Still, it is both necessary and feasible to further enhance the sustainability of cereal cropping systems. Many new practices have a proven ability to conserve water as well as soil and land, and to use purchased inputs (pesticides and fertilizers) far more efficiently. With innovations already available, the amount of water used in current rice cultivation techniques, for example, can be significantly reduced from its present high level.

Irrigation scheduling, laser land levelling, drip irrigation, conservation tillage, precision nitrogen fertilization, and cereal varieties tolerant to drought, flooding and heat are among the most promising options. In northwest India, scientists recently determined that optimal practices can reduce water use by 40%, while maintaining yields in rice-wheat rotations.

There and in many other places, the adoption of new practices to improve cereal production in the wet season not only leads to more efficient resource use but also creates opportunities to diversify crop production in the dry season. Improvements to increase cereal crop yields also reduces their environmental footprint; using less land, enhancing carbon sequestration and biodiversity and, for rice, reducing methane emissions per kilo of rice produced. Given the enormous extent of cereals cultivation, any improvement in resource use efficiency will have major impact, while also freeing up vast amounts of land for other crops or natural vegetation.

A major challenge now is to improve access to the knowledge and inputs that will enable millions of farmers to adopt new techniques, making it possible both to diversify production and grow more with less. Another key requirement consists of clear signals from policymakers, especially where land and water are limited, about the priority use of these resources — for example, irrigating low-value

cereals to bolster food security versus applying the water to higher value crops and importing staple cereals.

Toward a sustainable dietary revolution

Future-proofing the global food system requires bold steps. Policy and research need to support a double transformation, centered on nutrition and sustainability.

CGIAR works toward nutritional transformation of our food system through numerous global partnerships. We give high priority to improving cereal crop systems and food products, because of their crucial importance for a growing world population. Recognizing that this alone will not suffice for healthy diets, we also strongly promote greater dietary diversity through our research on various staple crops and production systems and by raising public awareness of more balanced and nutritious diets.

cereal and other crop varieties developed by CGIAR help address hidden hunger by providing higher levels of zinc, iron and provitamin A carotenoids as well as better protein quality. Farmers in many developing countries are already growing these varieties.

To help achieve a sustainability transformation, CGIAR researchers and partners have developed a wide array of techniques that use resources more efficiently, enhance the resilience of food production in the face of climate change and reduce greenhouse gas emissions, while achieving sustainable increases in crop yields. At the same time, we are generating

new evidence on which techniques work best under what conditions to target the implementation of these solutions more effectively.

The ultimate impact of our work depends crucially on the growing resolve of developing countries to promote better diets and more sustainable food production through strong policies and programs. CGIAR is well prepared to help strengthen these measures through research for development, and we are confident that our work on cereals, with continued donor support, will have high relevance, generating a wealth of innovations that help drive the transformation of global food systems.

Why Your Seeds Are Not Germinating



Non-sprouting seeds can sound discouraging but it is nothing to stress about. Not all seeds are the same; most of them need variable conditions for optimum growth.

Ms Annet Nduku, a farmer in makueni county chose to plant grains after seeds she bought from an agro-input shop failed to germinate.

Nduku's experience is no different from other farmers whose seeds have failed to germinate. However, with some close observation and patience, seeds can germinate just fine.

Extreme temperature and lack of consistent moisture are the likely causes of seeds not germinating or seedlings withering. Here is a list of factors that affect seed germination and the condition can be avoided by taking care of these small things.

Seed storage: Storing the seeds in an appropriate manner is crucial to keep their germination potency. Seeds must be kept out of moist areas to avoid rot. It is also important to keep them out of overheated areas so that they do not dry out. "Store the seeds in an airtight container or packet, in a cool and dark place. Remember to read the seed packet for storage instructions," says Martin Mwobobia a crop agronomist.

"If you make your own seeds, remember to never put them away without letting them dry completely as this can cause them to rot or mold. Also, make sure the seeds

you save belong to a healthy parent plant otherwise they can harbour infection and prevent sprouting," he adds.

Seed quality: Most of the stores and nurseries sell hybrid seeds but you would like to start with heirloom and pure seeds for a healthier crop as most plants are otherwise treated with pesticides and fertilisers. Be sure to purchase seeds from a trusted seeds company or a seed bank for the best genetics. "A lookout for expiry date as expired seeds may not germinate at all is also necessary," says Mr. Mwobobia.

Seed dormancy: Seed dormancy is a condition in which seeds fail to germinate under optimal environmental conditions. "Seeds come out of their state of dormancy if their dormancy factors are broken in physical or chemical form. Seeds often have a thick seed coat constituting physical dormancy. That is why it is recommended to pre-soak or scratching the surface of some seed varieties. Many seeds have internal chemical dormancy that prevents germination," he add.

Spacing and placement: While some seeds require pre-soaking, or to be scratched off their coats to break dormancy, others can be directly sown. It is extremely important to ensure that they are planted at just the right level of depth. Overcrowding can cause various nutritional problems. Make sure that too many plants are not competing for the same limited resources by putting them together in a tight space as many shall surely lose.

Soil temperature: When it comes to planting, timing is key as it involves temperature levels. Be watchful that the soil temperature is not too cold for your seeds. Mr Mwobobia recommends that you keep them above 15°C as they require warmth to germinate.

Similarly, the soil temperature should not be too warm otherwise the seeds are going to cook and consequently die. "Watch out when you throw them out on a warm day to keep the warmth levels in check, below 27°C."

Avoid over fertilizing: Resist the eagerness of planting seeds too early for your region just when the season approaches as they won't germinate, or die off before they are ready to sprout. Also, make sure you are not over-fertilising the soil. While it is normal to be concerned about soil health, it is also possible to add more than is needed.

Pests and diseases: The farm is a host of a huge list of possible diseases, insects and pests that can infect seed germination and stop their growth. If you have sown directly, chances are they might become a feast for birds, mice, and other things capable of eating your seeds.

Similarly, your farm is equally vulnerable in the initial few weeks after you plant. Your seedlings and plants can be prone to some of the common attacks of aphids, nematodes, snails, wireworm, beetle worm, and leafhoppers.

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Africa's Youth as a Demographic Dividend

By Dr. Segenet Kelemu - Director General, icipe

One of icipe's strengths is constant alertness to the changing developmental needs arising from emerging issues in Africa. Currently, the Centre recognises the urgent need to create productive employment for young people.

Africa has the youngest population in the world, with more than 400 million people aged between 15 to 35 years. This "youth bulge" will become a demographic loss if the status quo is maintained. For example, while the young people make up 40 percent of the continent's workforce, they also comprise 60 percent of the unemployed. And that is not taking into account the "poor working youth", that is, young people in vulnerable employment and those who are underemployed in informal sectors; or unpaid working youth, majority of them women.

icipe is committed to contributing to realising the potential of the youth as a demographic dividend for Africa. The selected examples below demonstrate the Centre's approaches and outcomes towards the goal of harnessing the youth, as Africa's most valuable resource.

Dignified jobs

The dignity of any unemployed or

underemployed person is compromised due to personal frustration, as well as the risk of marginalisation and social exclusion. In contrast, dignified jobs enable people to exploit the most valuable asset that they hold – their labour – leading to meaningful livelihoods, enhanced social status and, overall, healthy economies. One factor that may contribute to such opportunities, especially for the youth in Africa, is

work along honey and silk value chain. The venture builds on icipe's extensive experience in leading successful modern beekeeping and sericulture enterprises across Africa, including development and marketing of related innovative high quality products. MOYESH will capitalise on significant progress made through the Young Entrepreneurs in Silk and Honey (YESH), a project implemented in Ethiopia



the transition from informal to formal economies.

This policy driven process should be supported by efforts to increase skills and specialisation, and endeavours to tap into the entrepreneurial potential of young people. Indeed, this is the vision of the More Young Entrepreneurs in Silk and Honey (MOYESH) project, launched collaborative initiative between icipe, Mastercard Foundation and the Ethiopia Jobs Creation Commission. The MOYESH project aims to see 100,000 young men and women in Ethiopia secure dignified and fulfilling

by icipe and the Mastercard Foundation between 2016 and 2019.

Agriculture and the youth

Agriculture has immense potential to create employment opportunities for young people, turning rural areas into sites of possibility and transformation, while also curbing urban migration and its associated challenges. However, agriculture continues to be perceived as an option for the older generation; the least educated; few young people consider farming a profitable or desirable opportunity. But, icipe technologies and strategies are

successfully attracting young people to agriculture. For example 30% of all farmers using the Centre's Push- Pull technology are aged below 35 years.

Push-Pull controls the main constraints of cereal production: Striga, stemborers and fall armyworm infestations, while also providing quality fodder and improving soil health. Young Push-Pull farmers include Peace Nakato, a 25 year old primary school teacher from eastern Uganda who has realised her passion for farming, while also rescuing her family's piece of land that was on the verge of being abandoned due to the various menace mentioned above.

In addition to impressive cereal harvests, she also uses the technology as a platform to rear pigs, dairy cows and goats. icipe's fruit fly integrated pest management strategies and technologies enhance the quality, quantity and marketability of yield. Access to the icipe IPM packages has

Unique partnerships

Against the din of the numerous odds stacked against them, it is easy to forget the amazing talent embodied in Africa's youth. Predominant narratives project young people as a passive demography. But icipe has had the privilege of welcoming the youth as a unique category of partners; ambitious, skilled, savvy, and apt in identifying solutions for socio-economic challenges. For example, our Insects for Food and Feed programme has linked us with Kimani Mungai, a 25-year-old Kenyan postgraduate degree holder from the UK, and an entrepreneur, focused on addressing the protein scarcity faced by farmers.

Having started off selling brewer's yeast to dairy farmers to enhance milk yield, and to icipe for the manufacture of fruit fly bait, he has now co-founded a company specialising on black soldier fly farming for the feed industry. The entity is coordinating over 2000 farmers, collaborating with icipe

Tech-driven initiatives

For long, the effective translation of knowledge, as well as transfer of technologies for impact has been a challenge for many research and development (R&D) organisations in Africa. The booming technology scene driven largely by mobile phones, has become an important platform for an R&D shift across

Africa, for example by providing alternative dissemination pathways for knowledge and technologies. Capitalising on Africa's 'digital generation' – their technological ability and desire to lead socio-economic change – will create a win-win scenario for individuals and economies. For example, icipe has partnered with mHealth Kenya Ltd, a mobile phone based health Solutions Company, to develop and implement a cloud-based agrovet system known as LiMA to market and distribute the Centre's tsetse repellent collars. The result is an intergenerational effort that has mobilised community members across the spectrum, bolstering availability and accessibility of the tsetse repellent collars, creating mutual learning, income generation opportunities, big data and a platform to address other challenges like pest and disease surveillance.

Engendered approaches

Young women face substantial barriers to enter the labour market. Indeed, research shows that the chances of young women being unemployed are twice as high as those of young men. There is also evidence that technologies can effectively benefit women if designed and delivered with a gender lens. Therefore, all icipe's research activities are designed to promote equality of opportunity and outcomes for women and men. As a prerequisite, we continue to make extensive efforts to engender the research and development impact pathways of technology development and adoption; capacity development; and policy influence.



provided a new lease on life for Joseph Wambua, a 31 year-old Kenyan and former urbanite. After an unsatisfactory stint as a computer programmer in Kenya's capital, Nairobi, Joseph relocated to Machakos County, a farming region in eastern Kenya, where he is using mango farming as a base for a thriving livelihood.

to provide training and marketing, through a participatory out grower model and inclusive business approach. Meanwhile, in the heart of Kiambu County, Central Kenya, 24-yearold Talash Huijbers, who earned a degree from the Netherlands, has initiated a thriving enterprise to rear BSF primarily for the fish industry with support from icipe.

Combating the Enemy: Towards Mitigating Postharvest Disease Losses in Sub-Saharan Africa

According to the Food and Agriculture Organization, about 45% (roughly 1.3 billion tons) of harvested crops are lost annually. These food losses and waste are mainly at the postharvest level of the food supply chain. Postharvest losses encompass losses involving agricultural products from the moment crops are ready for harvest or after harvest. These losses may involve a loss in quantity over time or quality losses of important nutrients and may be due to contamination by mycotoxins, for example.

Although loss of quantity and quality can occur at any link in the postharvest chain, in sub-Saharan Africa, estimated postharvest losses of fresh produce occur between production and retail sites. Sadly, these losses are caused by certain socioeconomic factors. They include inadequate marketing systems, inadequate transportation facilities, government regulations and legislations, lack of tools and equipment, lack of information and poor maintenance facilities.

Why do we need to invest in reducing postharvest losses?

Doing so will increase food availability thereby improving food security. Second, the adverse health effects when contaminated food is consumed will

be averted, improving food safety. Third, unnecessary resource use will be reduced such as land, fertilizers, pesticides, fuel and water. Lastly, it will enable profit increment for actors (smallholder farmers and agribusinesses) in the food value chain.

The nature of postharvest deterioration can be attributed to physiological changes such as ethylene production, compositional changes, water stress, chilling injury, sprouting and rooting. Losses may sometimes result from physical damage caused by the weather, insects, birds, rodents and farm implements.

Postharvest deterioration may also be due to chemical injury and to a greater extent, pathological decay. Postharvest diseases significantly reduce the shelf-life of harvested crops in sub-Saharan Africa. For example, the fungus *Aspergillus* spp. affects grains such as maize and produce mycotoxins (aflatoxins) which pose health risks to humans and animals. Some *Fusarium* spp. which produce mycotoxins are also postharvest pathogens of cereals, root and tuber crops.

Since the most critical factor that affects the development of storage fungi is moisture, control measures include maintenance of grains at low moisture content and/or temperature. Besides protecting grains from insect damage,



chemical fumigation with methyl bromide or phosphine has been the practice. Moreover, the use of natural pesticides such as plant extracts and essential oils is being explored by farmers. In some cases, hermetic storage has been employed which entails the use of metallic silos or Purdue improved cowpea storage (PICS) bags.

Due to the toxicological risk of residual chemicals in food products, their application in the postharvest period has been limited.

The increasing
relevance
of food
and

““
Although loss
of quantity and quality
can occur at any link in
the postharvest chain, in sub-
Saharan Africa, estimated
postharvest losses of fresh
produce occur between
production and
retail sites.

environmental problems, as well as growing demand for energy conservation through natural “green” technologies and organic products, would make it highly desirable to have an approach to the reduction of postharvest food losses that is efficient, environmentally friendly, and bio-safe.

Natural microbial antagonists such as bacteria which are present on fruits and vegetables may be suppressing fungal growth.

On the other hand,
artificially introduced
microbial

antagonists
such as

yeasts, fungi and bacteria (*Pseudomonas* and *Bacillus* spp.) can also be used to suppress fungal growth. These microbes are known to act by competing for space or nutrients, production of antibiotics and/or volatiles, direct parasitism and via induced resistance.

In promoting the use of bio-safe microbial antagonists, two successful examples readily come to mind: one applied in sub-Saharan Africa and the other in the United States. In partnership with the International Institute of Tropical Agriculture (IITA) and the United States Department of Agriculture Agricultural Research Service (USDA-ARS), Aflasafe® was developed based on atoxigenic strains of *Aspergillus flavus* to control aflatoxin produced by *Aspergillus flavus*. Furthermore, two commercial formulations of *Pseudomonas* named Bio-Save 10 LP and Bio-Save 11 LP, contain *Pseudomonas syringae* strains ESC-10 and ESC-11, respectively. These products are applied in packing houses to prevent postharvest fungal diseases during storage of citrus, pome, stone fruits, and potatoes.

Biological control products based on beneficial strains could be considered as a research-led alternative to chemicals and/or food preservatives in the control of postharvest diseases. Considering the leading success stories in sub-Saharan Africa such as Aflasafe®, there is room for the discovery and application of more of these “green” and safe technologies in the biocontrol of postharvest diseases.



How Changes in Weather Patterns Could Lead to More Insect Invasions

Outbreaks of insect pests and insect invasions are on the rise on the African continent.

Currently, several African countries – including Kenya, Ethiopia and Somalia – are dealing with the one of the most devastating outbreaks of desert locusts. This comes after recent fall armyworm invasions which affected more than 44 African countries. Countries also grapple with more localised pest invasions of insects like the South American tomato moth and maize stem borers.



Many countries suffer from a lack of food because the insects can consume, or destroy, huge amounts of crops. Just five invasive insect pests are estimated to cost the African continent US\$1.1 billion every year.

Insect-pest related crop losses and pest invasions are projected to increase as the climate changes. Projected changes include changes in temperature – with many regions becoming warmer – and the amount of precipitation. Insects thrive in warmer temperatures.

Studies show that insect-pest related yield losses for maize, rice and wheat are expected to increase by between 10% and 25% for each degree Celsius of warming.

The impact will be huge. These crops are the three most important crops in the world, accounting for 42% of calories eaten.

Broadly, there are two explanations for why there'll be more insect invasions: because the changing weather modifies insect traits and because the changing weather is having an impact on their food, natural enemies and predators.

Insect traits

A changing climate causes changes in temperature. This has a huge

impact on insects because they are cold-blooded animals. This means that their growth, development and life-cycles are regulated by temperature. Consequently, when temperatures are warmer or colder than the norm, this directly affects their development, growth, reproduction, and ultimately population numbers and distribution.

As temperatures rise, the insect's metabolism speeds up. Because they are burning more energy, they consume more, develop faster and larger, suffer

the number of crop plant eating insects. There's a bit of contention as to why this is the case, but the plant stress hypothesis suggests that insect performance increases with plant stress because the plant's level of investment in its chemical defences decreases.

Changes in the weather can also affect the territory that insects live in.

There's compelling evidence that insect distributional ranges are changing. As warming happens, insects are moving into new territories and exploring new habitats.

such as ladybird beetles, which eat aphids. They can also be introduced to control pests; *Cotesia flavipes*, for example, is an insect that has been introduced in various countries to control stem borers.

In a perfect world, natural enemies should be abundant when crop plants are under pressure from insect pests. But the ability of natural enemies to find the insect pests depends on their ability to tolerate changing weather conditions and how well they can move.



And when they find the insect pests, other factors – like the size of the insect host – are important. For instance, parasitoids (insects whose larvae live as parasites which eventually kill their hosts) develop inside the host. If the host insect is too small, there won't be enough food for the larvae to grow and hatch. This may determine whether they stay to protect plants from the pests.

These are some of the key findings about the impact of climate change on insects. There is still a lot to be discovered, though.

less mortality, reproduce faster and lay more eggs. The end result is an increase in populations, and consequently, more crop damage.

A changing climate will also affect rainfall patterns. We are already seeing this with more incidents of droughts and floods. These changes affect the interactions between insect pests, plants and their natural enemies.

For example, there is substantial evidence showing that drought stress increases

They do this to find food and to escape competition and natural enemies.

Extreme conditions – like drought and floods – also alter the nutritional value of plants. Faced with the problem of a less nutritious plant, insects consume more plant tissues to get the amount of nutrients they need.

Natural enemies

Climate change may also alter the interaction of insect pests and their enemies. These may be natural predators

More research needs to be done to develop a clear understanding of how climate change directly and indirectly affects insects, to help us predict what invasions could happen, and where.

Dr. Esther Ngumbi is an Assistant Professor with the Entomology Department at University of Illinois at Urbana Champaign, Illinois. She is a Senior Food Security Fellow with New Voices, The Aspen Institute and has also served as a Clinton Global University Initiative (CGI U) mentor for Agriculture.

Raising Women to Farm



family farm succession.

The interviews allowed the writer to understand the common characteristics for daughter-succession as well as possible reasons why there are so few daughter successors. For example,

“Tell me about your journey in agriculture”, “what are your thoughts on (a particular issue or challenge)?”, “Why do you think other daughters are not interested in returning to their family farm?” Listening and sharing the stories, as well as recounting the writer’s own, it was clear there were remarkable similarities between the experiences of daughters in agriculture across the country.

There is need for a paradigm shift in agriculture involving structural changes to the way people think and make decisions about succession. We share the voices of role model daughter successors as scenarios for women wanting to tackle the management and ownership of their family farm and various perspectives from women who are role modelling change, including a young woman who became the *Farmer of the Year* following a success.

There is need for parents wanting to give their daughters equal chance and access to opportunity to farm as well as mentor their daughters about what pathway they could possibly take before returning home. This includes ideas such as daughters needing to feel involved in the farm at a young age

and having the same access to experiential learning activities as sons. Our discussions showed that confidence is instilled from a young age from parents, and compared with sons, daughters have not typically been granted the confidence, or had the upbringing and socialisation to become successors.

The daughters that had an equal upbringing in terms of experiential learning activities, were strong minded, fiscally independent and successful in being leaders in their community and on their farm today. These outcomes suggest that farm parents must be actively managing succession in their family from birth to adulthood, and must be versed on how to engage daughters. Daughter successors should be engaged with tangible opportunities such as sharing the reward and financial responsibility of the farm, purchasing shares in the business, being distributed dividends based on yield or improving performance or gaining a profit share by owning inputs, producing outputs.

For parents, giving equal chance to both sons and daughters to learn the farm knowledge is critical. Parents must understand their own biases and expectations towards or against women which impact on their decision for a

While initiatives for women in agriculture in Kenya have been growing in popularity, none have focused on building the capacity of farm daughters to become farmers. Demand for food is rising and agricultural technology is advancing rapidly, but many family farms will cease to exist in the coming decades unless farm children, particularly daughters, become more engaged with farming. Daughters are keen to gain farming skills and knowledge and they want to learn how to farm, but while daughters may study agriculture and go on to work in the industry, daughters are generally not returning to become farm successors.

Cereals Magazine made farm visits and interviewed over 50 farmer’s daughters and some agribusiness consultants, academics, and private and public-sector managers in the agricultural industry exploring the topic. Questions for daughter successors were open-ended to give daughters maximum opportunity to reflect on their pathways to



successor. Parents must rethink the idea that boys are 'born farmers' as it leaves daughters to feel they are not fairly recognised for their unique strengths and capabilities.

Gender bias in farm succession should be a policy issue for the various groups in Kenya that already focus on empowering women in agriculture. In addition, the government should tackle the issue of women's access to land and resources in their policy discussions. It should evaluate how to tackle challenges to allow more women to be handed down the family farm and how this will create tremendously diverse outcomes for industry.

There has been wide spread exclusion of farm daughters from family farm succession in the past and patriarchy, gender role stereotypes and tradition are pushing daughters away from being socialised as farmers, but times are changing. Therefore farmers, succession planners, consultants and advisers should foster an environment that is inclusive of both sons and daughters. The typical 'son and daughter-in-law taking over the farm' scenarios should not be automatic. Resources and materials which reinforce old patterns of

patrilineal succession and gender role stereotypes should be removed.

For as long as family farming has existed in agriculture, sons have been taking over as farm successors. For traditional reasons, daughters are rarely given the opportunity of farm succession. Family farm management and leadership has become a sort of male hegemony and hierarchy as a result, and the status and economic power of women in agriculture has traditionally depended on males.

One should question whether the family farming tradition in Kenya is built to last given the present generation of farm children aged in their twenties and thirties are comparatively disengaged with farming than previous generations. Does this suggest the culture of family farming is in decline, or is there another issue that is looming in the shadows, limiting the pool of young talent encouraged for farm succession?

It is no gainsaying that change in traditional patterns of family farm succession is long overdue for daughters to be encouraged and recognised as capable farmers. Daughters who have achieved family farm succession tend to return home in their

twenties and early thirties with advanced education and training and have developed key talents or skills to set them apart from their other siblings, or employees.

The concept of 'Women in Agriculture' must not be associated with the concept of being a farmer's wife, mother or daughter-in-law. The pigeonholing of women into these categories shuns the daughter farmer scenario and perpetuates gender bias.

This is a time with crippling challenges; to list a few there is

climate change, biodiversity loss, pollution, disease, pandemics, famine, trade wars. Farmers are exposed to many risks and the industry needs an injection of diverse individuals, both men and women in the food and agriculture system, to further enhance farm-gate viability, enough to survive for generations to come. Women bring diversity of thought to leadership in agriculture, and see the importance of working collaboratively as an industry in a harmonious fashion. Both men and women are needed to lead us forward into the future to be sustainable for many generations to come.

It has been demonstrated that daughters have the ability to manage all different types of farm operations and strongly believe themselves to be the custodians of their family land. But it has also been revealed there is a long road ahead in shaping industry beliefs about succession, and that daughters strongly rely on the backing of their parents and community to believe in them.

While there are many initiatives to encourage women into agriculture, without access to farm land and farm opportunity through succession, women will never be treated equal to men. Parenting is key and some issues specifically common characteristics, suggests a paradigm shift is necessary. It is not enough for parents to say, 'our daughters can farm if they want to', as indicated, farmers actually need be doing something to manage this and encourage daughters to farm from as early as childhood.

It has been demonstrated some shared similarities between daughter successors worldwide that will help re-affirm daughter successors' own identity as a farmer, but also provide a framework for the next generation of women hoping to reach the farm succession summit.



Peal Agro Services Enterprises Company Limited is a Kenyan Agricultural Company that is involved in various seeds registration, production and marketing. We are currently dealing with maize, soy beans and vegetable seeds.

We are an independent Seeds and Development company and as so we focus on continuity in the long term and healthy growth. Those two factors are essential for enabling us to focus on our greatest strengths: Researching on and developing high-quality seed varieties. Many years of experience and of investments in people, breeding, Research and innovation have laid the basis for a strong, healthy company – Peal Agro.

The brands development.

In 2018 through selection of materials from Cimmyt, PEAL AGRO managed to get two hybrid maize variety released (KISHINDO PLH458, SWARA PLH457) in Kenya. These varieties are three way crosses, KISHINDO is a mid-altitude variety with 100 days to maturity and SWARA is a low altitude variety of 90 days maturity time. Through assistance by the Syngenta Foundation East Africa and the Pan African Trials under Soya innovation Labs (University of Illinois) a feed the



Peal Agro Services Enterprises Company Limited: A strong, healthy Seed company



future USAID program, Peal Agro entered into a MoU with KALRO to multiply and market two of their newly released soybean seed varieties namely, Gazelle and BP SB 19.

Certified seeds for both maize and soybeans are in production and are expected in the market in the coming season of October/December.

Vision

To be the leader in Seed Research, production and distribution, utilizing the latest proven technologies in Kenya and the region.

Mission:

To ensure a healthier and safer stakeholder community with sufficient knowledge and skills necessary for managing sustainable crop production modalities, whilst utilizing the latest technology and techniques in order to enhance our global food security.

History, present and future

An entrepreneurial spirit and innovation have been the driving forces

behind Peal Agros' rich history. So much is already evident from the strong determination with which Peter Mutisya established Peal Agro back in 2010, and from the great success he achieved in conducting research in his career spanning over 25 years.

How we achieve it

- Experienced & exceptional team spirit

- Trustworthy, sincere & excellent relationship with clients
- Great relations, support & sound buying power from our suppliers

Our business principles

- Efficient communication
- Transparent cooperation
- Attention to detail
- Personalized service

- Budget & cost control

Expansion

Peal Agro future plans include expansion on the line of oil seeds, specific vegetable seeds, flower cuttings and tissue culture. In line with this the company intends to set up high technology plant laboratory for seed research and development. Such research laboratory will be used for innovative technologies in plant seed development.

A real multinational company!

Peal Agro is an international company in that it has vested interests in Tanzania and Uganda at the moment and plans to expand to Rwanda, Burundi and Ethiopia in the next step. The intention is to create a global seed production unit in Kenya to supply in the region.

Realistic sustainable entrepreneurship

Realistic sustainable entrepreneurship is our goal. We believe that a company cannot really succeed unless it is in full harmony with its environment. As an international company we have nature in our genes. And that's why we want to do everything we can to make a positive contribution towards our changing living environment, healthy food and healthy food production for the rapidly expanding global population.

Creative and innovative breeding

Our Research & Development (R&D) department is the heart of our company. It is the source of our innovative seed development and release. The combination of creativity, expertise and many years' experience in RnD & breeding programs is our greatest strength. We invest more than 30% of our turnover in innovation, research, and also in the development of our employees' knowledge. To enable you to continuously develop top-quality Seeds varieties that are reliable and offer security anywhere in the world.





Demonstration Farms Can Help Revolutionise African Agriculture

Farms that are used to teach agricultural techniques and technologies – known as demonstration farms – are a smart investment that can help accelerate the adoption of game-changing innovations.

Farmers can learn new ways of doing things without having to do it on their farms. Demonstration farms are used to teach various agricultural techniques and technologies, showcase new or improved crops. They also serve as a venue to research and test new methods alongside traditional ones.

Their sizes can vary widely, ranging from small to big farms. Depending on what's being tested or showcased, the demonstration farm could have different types of crops and crop varieties, livestock or poultry breeds, fertiliser treatments or technology, such as drip irrigation.

They are often owned and operated by universities, government or private research institutions, private industries or agriculture focused start-ups and non-governmental organisations.

The importance of demonstration farms was first recognised over a century ago by agriculturalist Seaman Knapp. He believed in the philosophy of teaching through demonstration. He's credited as the father of demonstration farms which are used around the world.

But demonstration farms have the potential to do much more. There are still far too few of them in Africa. If carefully designed, they could help revolutionise African agriculture. They could help solve some of Africa's most persistent challenges including degraded soils or the low adoption of irrigation technologies.

They could also help with the uptake of new concepts that are transforming agriculture including precision agriculture – a farm management system that ensures soils and crops receive exactly what they need for optimal growth and productivity. Or conservation agriculture – a sustainable agriculture production system comprised of three linked principles; minimal soil disturbance, mixing and rotating crops and keeping the soils covered as much as possible.

Where it's working

The US Department of Agriculture recently funded statewide demonstration farms to showcase soil health practices and related cropping system comparisons.

In Israel, a centre for agricultural development has trained over 270,000 people from 132 countries in its various courses, 70% of which use demonstration

agricultural farms.

There have also been substantial advances on the continent. In Nigeria, a fertiliser company has over 3,000 demonstration farms that it uses to showcase and teach farmers about modern farming practices. In Ghana, the Ministry of Food and Agriculture has established over 1,242 community demonstration farms that showcase new agricultural technologies.

In Kenya a demonstration farm in Meru is teaching women everything they need to know about conservation agriculture. This includes covering crops like grass or legumes, to provide seasonal soil cover to protect bare land. These kinds of steps improve crop productivity, increase yields as well as profits and food security. Farmers can see how practices work over time, ranging from one season to another to a period of years. They are then able to use them on their own farms. In Kenya over 10,000, of over 7 million farmers, have adopted these practices.



China has rolled out 23 demonstration centres across Africa with a goal of upgrading African farming by passing on successes in agriculture.

But China is not alone. Agriculture-focused companies like Amiran Kenya have used demonstration sites to showcase the technologies they sell. Their aim is to prove to farmers that these really work and that they can be used to improve productivity and generate income. Their kits have an easy to use gravity based drip irrigation system, a water tank and all the necessary agro-inputs. There were soon success stories from farmers that bought these and this helped to spread the word.

Non-governmental organisations are also using demonstration farms. Development in Gardening in Kenya, for example, uses demonstration farms as classrooms to showcase good agricultural practices.

One of the most successful initiatives is helping solve one of Africa's greatest challenges – degraded soils. The Alliance for a Green Revolution in Africa has set up over 155,000 demonstration gardens

to showcase best soil health practices across 13 countries. Farmers using these practices have doubled, and in some cases tripled, their crop yields.

More to be done

The need for demonstration farms can't be overemphasised – particularly in Africa. Challenges such as droughts, degraded soils and low crop productivity persist and threaten the livelihoods of millions of people.

One of the major challenges is funding. Setting up demonstration farms to try new technologies or best practices takes lots of funds, time and effort.

Luckily there are several funding agencies, including governments, that fund demonstration farms. The Bill and Melinda Gates Foundation for example funded the Alliance for a Green Revolution in Africa's soil health initiative. The Ministry of Agriculture in Ghana has also recognised their importance and funded 1,242 demonstration farms.

This trend should continue.

The Importance Of A 13-Week Cash Flow Forecast

It is no secret that the recent pandemic has wreaked havoc on the global economy, pressuring businesses across the green industry to take severe measures to “weather the storm” to ensure their survival. As businesses, both large and small, are forced to rapidly address their liquidity positions, we increasingly hear about actions aimed at preserving cash that have included asset sales, drawdowns of revolving lines of credit, site closures, employee layoffs, vendor negotiations, employee compensation adjustments and furloughs.



Given that cash is the “lifblood” of any business in our space, measures such as these are often necessary. However, through times of business expansion and contraction, we have witnessed organizations expending substantial time and resources developing tactics around either/or cash generation and cash preservation. As a result, we strongly recommend to farmers that they invest the time and resources towards developing a basic but often overlooked management tool; a 13-week cash flow forecast model (the “cash flow forecast”).

In this brief summary we will talk about the key components of a cash flow forecast as well as a few of its key benefits, namely in empowering farmers to make thoughtful, informed decisions that are data driven in nature.

The forecast and key components

The cash flow forecast is a real-time model that breaks down the cash inflows and

outflows of a business into discrete parts and it provides the most accurate depiction of a business’ financial health (or lack thereof) as well as valuable insight into the drivers of that health.

It is important to note that development of this model should incorporate the involvement of senior leadership that provides input into the underlying assumptions and is willing to provide potential ownership: the development and reporting of specific categories and/or line items. These owners need to change their mindset to one of “cash in and cash out” rather than “what hits the P/L” (example: sales mean nothing if they can’t be converted to cash). While the high level components of a cash flow forecast are shown below, each of the key component buckets should be segmented into specific line item components labeled with sufficient detail in order to create period by period comparisons (for example, “Leases” may be a line item within Cash Disbursements).

Key component buckets include

- **Beginning Cash Balance**
Recommend calculating on a Book Cash basis and will require a Bank to Book cash reconciliation.
- **Cash Receipts**
Typically consists of both the collection (both amount and timing) of existing A/R as well as future sales and their associated collection (both amount and timing); segmentation by key customer with appropriate DSO assumptions. Include misc. sources of cash as well.
- **Cash Disbursements**
Break out into operating cash, investing cash and financing cash disbursements (subtotals). Operating cash disbursements can be thought of as normal course payments for items such as payroll, supplies, rent, etc. Investing cash disbursements can consist of several different things but the main line items we

typically see needing attribution are capital expenditures. Financing disbursements relate to debt, equity, dividends. The most common relate to interest expense or principal payments on loans.

The beginning cash balance adding forecasted weekly cash receipts less forecasted weekly cash disbursements can provide a real-time view on the organization's liquidity. The analysis should then be rolled forward each week. While opinions differ on the appropriate time period, 13 weeks is generally considered a good midpoint period; short enough to provide real-time visibility and accuracy (one calendar quarter) but long enough to provide the business insights that can be strategic in nature.



The benefits of visibility in decision-making We subscribe to the theory that enhanced visibility into the go-forward liquidity position of an organization can be empowering and can result in thoughtful, informed and data driven decisions. Among the numerous benefits of a cash flow forecast are the following:

1. Allow the business to identify and enhance cash systems and controls

– numerous issues can be identified and addressed such as how cash

disbursements are administered (process), how the business can understand amount and timing of financing requirements, how sales are forecast with associated cash receipts and when the business may hit roadblocks that don't allow it to fund key operating costs such as payroll. These are just a few of the benefits.

2. Allows the business to address its sales and collection process – perhaps certain key customers (or profiles) don't pay as timely as others, the business may not be invoicing correctly or in a timely manner, appropriate mechanisms, systems may not be set up to accurately record sales, discounts and importantly capture cash receipts. We have found on numerous occasions that businesses don't actively

monitor and aggressively follow-up on delinquent A/R or offer incentives (assuming make economic sense) to accelerate collections. Sales don't mean anything if they cannot be collected.

3. Allows the business to identify non-core assets and create asset disposition plans - in these circumstances, businesses are forced to address assets that are non-core in nature to key business operations.

These may be real estate, inventory, certain business lines that may be unprofitable, etc.

If assets are non-core to operations and they can be monetized they should be or at least there should be some consideration of this possibility. Not only does this allow a business to generate cash but it also removes management distraction and time from administering these assets.

4. Allows the business to address its vendors in a critical manner – with a cash flow forecast the theoretical becomes the actual and a light can be shone on vendors regardless of type that are bleeding cash from the business but may not be generating significant ROI. With a forecast, the amount, timing, magnitude of these disbursements can be readily understood and this can lead to better process on the front end in terms of identifying and approving vendors and vendor relationships.

We have found on numerous occasions that businesses, regardless of whether they are in expansion or contraction mode, have found the benefits of a cash flow forecast to be significant as it illustrates in a dispassionate manner how the resources of the business are being allocated. With this knowledge, data driven decisions can be formulated.

Once the forecast is prepared, it will be critical for the business to pressure test assumptions on a weekly basis, understanding actual versus forecast receipt / disbursement results versus prior assumptions and most importantly, understanding the reasons behind any key variances (are they permanent or timing in nature and why?). With the benefit of measurement, forecasts can be further refined for the business while key processes are bolstered, putting the business in a more advantaged position and enhancing the probabilities for future success.

Will Future Farm Shows Become a Virtual Experience?

David Odhiambo didn't mask his disappointment when he heard the news this: "In the best interest of our visitors, exhibitors, partners, and staff, ASK has made the difficult decision to cancel ASK shows in 2020 due to rapidly changing conditions related to the COVID-19 pandemic," stated the news release. "For the first time in its history, the show won't go on."



Attending a farm show is of great value for the farmer. "If I see a product online and submit a question, the response may not be immediate," he says. "I attend a farm show because I want to talk to a knowledgeable person right away. I'm able to ask questions and get an immediate response. When I leave a booth, I feel well-informed."

Not only does David go to farm shows to learn about the latest technologies for his family's farm, he's also an exhibitor. David, along with his brother Ben, owns and operates a family farm. Nearly 20 years ago, the pair showcased their first produce.

"When I attended my first farm show as a high school student, I thought it was fascinating, but I never dreamed that one day I'd be an exhibitor," David says. "As a small company, it's a great place to showcase your quality products. Visitors can actually see it, and they can ask questions. Through the years, we've also become



more confident as we stand behind our produce to help others understand who we are."

In its almost two decades in existence, they have sold into millions because of showcasing. While the two farm boys have seen success, they've also scaled back the shows they attend because of cost and the number of leads a show generates. "We used to do about seven outdoor shows, and about that many internal shows," David says.

The cancellation of shows like the ASK not only affects the agricultural community, it also impacts the local economy. "This is probably a low number, but the estimated impact to the country is huge, noting that number encompasses lodging, restaurants, and retail. Because visitors travel from all over the world to attend Nairobi international show, the cancellation also impacts airlines and other industries.

"Oftentimes, the international traveler will stay for a week or two, because they are not going to come just for the show and go





home,” he says. “They usually do farm tours and visit other attractions.”

A Rare Opportunity

Ideal for large and small growers as well as large and small companies, Agricultural shows provide a rare opportunity where you can truly connect with new customers/suppliers especially given how much of agriculture sales are managed through dealerships/retailers.

“Agricultural shows are one of the only events where customers can directly engage with suppliers and be exposed to new products beyond their normal retail circle. That has a lot of value,” says Martin Ndaisi.

“Agricultural shows give us that valuable face time with farmers. We get to interact one-on-one to show them our current lineup of equipment, the features on those machines, as well as our ever-changing technology offerings,” says Irungu Nderitu from one of the leading tractor suppliers, adding that exhibiting is more than just

equipment in their booth.

“It’s also the perfect opportunity for us to physically demonstrate what we have to offer with current as well as prospective customers. Whether it’s a ride and drive or an in-field demonstration, we want to provide those experiences, which they can then take back to their operation,” he says.

Going Virtual

As the world has increasingly relied on virtual options to stay connected during the pandemic, could it mean Agricultural shows will do the same especially given the threat of a second and third wave?

“While we continue to see a greater inclusion of media and digital content in the marketing programs across agriculture, which was happening before COVID, it still doesn’t replace the in-person experience you get from an agricultural show,” Martin says. “COVID will drive more innovation in this space and enhance the overall delivery, but I don’t believe we are to a point where it will fully displace Agricultural show events.”

Because field demos offer a very unique opportunity to see agriculture in action and to learn about trends in tillage, harvesting, etc., Nderitu believes this portion of a farm show will be very difficult to replicate virtually, if at all. “I think everyone recognizes that YouTube marketing videos are always done in perfect conditions,” he says. “Agricultural show demos help growers get a true look at side-by-side comparisons of equipment technologies.”

In order for an agricultural show to be successful, Martin says it has to create value in all three sectors of the event.

1. Attendees have to receive value/knowledge that exceeds the cost of admission.
2. Vendors have to receive value/sales opportunities that exceed the cost of attendance.
3. Organizers have to receive sales/marketing that exceed the cost of the meeting/delivery.

“If there were weak points in any of these three elements, a disturbance like COVID could absolutely put future events at risk and result in alternative delivery mechanisms,” he says. “My feeling – based on attendance numbers and the general excitement – is that this is not the case. After COVID passes, we will achieve the same level of value across all three required levels.”

“Agricultural shows are important to us, and they are something we always want to be a part of,” Martin says. “It’s really going to be up to us as companies to adapt and grow using both in-person events, as well as virtual events, to create the best possible experience for our customers.”

CEREAL FARMERS IN KENYA

FARM NAME	LOCATION	CONTACT PERSON	EMAIL	TELEPHONE	CROP MIX	ROTATION CROP
Chemusian ltd		Too	chemusian@gmail.com	0722209754	Wheat / Barley	
Kikwai farm		Patrick	padykikwai@gmail.com	0731817804	Wheat / Barley	
-	ELDORET	-	-	-	-	
Sergoit farm		Yani/ Kruger	tingaspikes@gmail.com	0718338099	Wheat / Barley	Maize
Komol farm		George Killi		0722732757	Wheat	Maize
Mohammed		Kaittany		053-2062234	Wheat	Maize
Elfam ltd		Ngetich		0721517701	Wheat	Maize
Mace foods		Margret Komen		0722840799	Wheat	Maize
Kuinet Tarus		Tarus		0721934176	Wheat	Maize
Moiben Chepkener		Chepkener		0719506980	Wheat	Maize
Chepkorio		Jelimo		0722571355	Wheat	Maize
Kenya ordnance		Chirchir		0721851931	Wheat	Maize
Kandelo		Kandelo		0720305041	Wheat	Maize
Kimoso		Kimoso		0734858619	Wheat	Maize
Silas Tiren		Tiren	skktiren@africaonline.co.ke	0725792463	Wheat	Maize
Shiv enterprises		Albert Kimwatan		0722652300	Wheat	Maize
Timothy Busienei		Busienei		0727085756	Wheat	Maize
Plateau Ngeria		Sile		0724752143	Wheat	Maize
Victoria Chebet		Chebet		0753466025	Wheat	Maize
Maji Mazuri		Ziwa		0723024971	Wheat	Maize
Kibogy Moiben		Kibet		0728706668	Wheat	Maize
Kapkabai Farm		John	wilchem@africaonline.co.ke	0722724990	Wheat	Maize
-	ATHI RIVER	-	-	-	-	-
Ausquest ltd		Stuart Barden	stuartbarden70@gmail.com	0703119444	Barley/ Wheat	Sorghum
-	KITALE	-	-	-	-	-
Bubayi		Jonathan Mayer		0735488001	Wheat	Maize
Panocal		Chris Carpenter	cereals@panocal.co.ke	0719505785	Wheat	Maize
Murmet		Chelimo		0722571355	Wheat	Maize
Cheptembe farm		Robin		0722817638	Wheat	Maize
Robert		Tuitoek		0722813381	Wheat	Maize
Biwott		Biwott		0720955748	Wheat	Maize
Express Farm		Mbugua		0722766176	Wheat	Maize
Western seed company		Harry		0720897860	Maize/ Wheat	
Kenya seed company		Mwarei		0722614639	Maize/ Wheat	Barley
ADC Farms Edward			edwardmwando@gmail.com	0728453942	Maize	Sunflower/ Pasture
-	MOLO	-	-	-	-	-
EAML		Gacheru		0722791563	Contracted farmers	Barley
-	KISUMU	-	-	-	-	-
Dominion farms ltd		Okoth		27494585	Rice, Maize, Sugarcane	

CEREAL FARMERS IN KENYA

FARM NAME	LOCATION	CONTACT PERSON	EMAIL	TELEPHONE	CROP MIX	ROTATION CROP
-	MT. KENYA	-	-	-	-	-
Oldonyo ltd		Brynn	brynn@oldonyo.co.ke	0722817163	Wheat/ Barley	Peas, Canola
Kisima ltd		Shaun	shaun@kisima.co.ke	0729924353	Wheat/ Barley	Peas, Canola
Wangu Investment		Ben	ben@wanguembori.co.ke	0724545475	Wheat/ Barley	
Marania ltd		Jamie	marania@maraniafarm.com	0721573634	Wheat/ Barley	Peas, Canola
Lengetia ltd		Sessions	Lengetiafarm@gmail.com	0722332647	Wheat/ Barley	Peas, Canola
Mastermind ltd		Gitonga	dgitonga@mastermindkenya.com	0722751488	Wheat	
Tumili ltd		David Beak	tumili@wananchi.com	0722823543	Wheat/ Barley	Peas, Canola
Thamba Ngombe		Thamba	thamba@gmail.com	0724927351	Wheat/ Barley	
Mt Kenya saw mill		shah	nainhshah@gmail.com	0722511691	Wheat	
-	NAROK	-	-	-	-	-
Simba Estate		SS. Dhillon	simbaestate@simbaestate.com	0722511460	Wheat	Maize
Farm Africa ltd		Raghu	raghu.penmetesa@farm-africa.com	0788299442	Wheat	
Lalela ltd		Neylan	neylan@macc.com	0722385329	Wheat	Sorghum
Mann Wheat ltd		Magal		0722518964	Wheat	
Green Farms		Wambugu		0722287337	Wheat	
South Sixx Farm		Guri	gurbir@southsiouxfarms.com	0722676878	Wheat	
Olerai ltd		Alistair	alandbill@olerai.co.ke	0728484659	Wheat	Seed Maize
Talent Farm		Paul	sarpau@internode.on.net	0729846736	Wheat	
Rm Farms		Amit and Sanju	rishi-amit2007@yahoo.com	0722225330	Wheat	Maize
Ndovu estate		Viney		0722824793	Wheat	Maize
Country motors		Singh	country@africaonline.co.ke	0722764763	Wheat	
Oldonyo Nairasha Estate		Karan	ssdhillon@africamail.com	0722323296	Wheat	Maize
Development Trust		David		0724741718	Wheat	Canola
Oratili ltd		Mahesh	farmpartsltd@africaonline.co.ke	0722848474	Wheat	Canola
Upland crops		Koos	fm@uplandcrops.com	0704681651	Wheat	Maize
-	NAIVASHA	-	-	-	-	-
Kijabe ltd		David Cullen	ndabibi@gmail.com	0729950910	Wheat/ Barley	
Soyonin ltd		Benjamin Kipkulei		0733605071	Wheat	
Livewire Ltd		Goddy Millar	info@livewire.co.ke	0722205992	Wheat / Barley	
-	NAKURU	-	-	-	-	-
Lesiolo ltd		Tundo Franco	frtundo@gmail.com	0724333322	Wheat / Barley	
Madrugada		Jonti	jonti@madrugada.co.ke	0722734179	Wheat / Barley	Maize, Peas, Canola, Sunflower
Tony		Hughes	hoozie@swiftkenya.com	0722808058		
Chepkonga		Andrew	andycheper@yahoo.com	0710308917	Wheat / Barley	
Siruai		Rose	skvarose@gmail.com	0722865892	Wheat / Barley	Maize
Sasumua Agriculture		Luke	luke@sasumua-agriculture.com	0722779618	Wheat / Barley	Canola, Peas, Sunflower, Maize
Kenana Farm		Oliver	pkenana@africaonline.co.ke	0722725002	Wheat / Barley	Canola, Peas, Sunflower, Maize
Remsons Ltd		Mugambi	remsons.ltd@gmail.com	0722807773	Wheat / Barley	
Molodowns		Chris Foot	ckfoot@gmail.com	0722717130	Wheat / Barley	
Gogar Farm		Hamish Grant	md@gogar.co.ke	0722327718		Maize
Kinoru Farm		Barlow	barlow@africaonline.co.ke	0725777479	Wheat / Barley	canola, Peas, Sunflower
Comply industries		Sandhu	sckihumba@complyindustries.com	0729870025	Wheat / Barley	

The Importance of Personal Protective Equipment In Pesticide Applications.

Pesticides are applied for protecting the quantity and quality of agricultural crops. Yet, these chemicals may have side effects on human health and the environment.



To minimize pesticide effects on human health, farmers have to use appropriate personal protective equipment (PPE) in all stages of pesticide handling since they play a prominent role in ensuring overall health and safety. However, empirical and research data support that farmers do not use PPE before, during, and after pesticide application. Thus, farmers can often suffer from acute and chronic poisoning by pesticides. Farmers have to be educated about the importance of PPE in pesticide use. The national authorities should provide up-to-date, accurate, and easy to understand information in the training of farmers in the use of PPE.

Pesticides are widely used by farmers for high quality and yield in the agricultural production. These chemicals can significantly improve quality and quantity of agricultural crops, but due to increasing sensitivity for environmental protection in recent years, different methods of crop protection are also used against diseases and pests. For example, cultural and biological methods of pest control can decrease pesticide applications.

Nevertheless, in certain cases, the application of pesticides against pests and diseases is rather inevitable. In chemical crop protection, using pesticide overdose or incorrect pesticide products may cause serious problems on

human health and the environment especially, in these situations, operators' health can be seriously affected, since pesticides can cause chronic and acute effects on human health

Some of these impacts are skin allergies, stomach pain, asthma etc. Thus, pesticides have to be applied using appropriate spraying methods to avoid negative effects. Agricultural workers should be educated regarding safe use of pesticides to prevent health and environmental hazards.

Pesticide exposure in operators and workers can be minimized by using personal protective equipment (PPE), such as coveralls, headgear, gloves, protective eyewear, and footwear.

These PPE include Apron/Overalls, Goggles/face mask, gloves, Gumboots, head cover etc.

In particular, farmers can be affected by pesticides in three different ways during pesticide use. These mainly include;

1. Oral exposure,
2. Dermal exposure, and
3. Exposure via inhalation

Especially during spraying with fog or aerosol small droplets, which are suspended in the air, farmers have to use a mask. If farmers do not use mask, pesticide droplets about 1e5mm in

diameter are accumulated in the lungs and the breathing tube. Furthermore, small droplets (<1mm) are spread in the lower part of the lungs. Operator exposure is defined as the exposure of people who are primarily involved in pesticide applications. About 97% of human exposure to pesticides during spraying occurs through contact with the skin.

Dermal exposure to pesticides is highly correlated with the manual contact with pesticide-treated plants and it is believed to be the major route of pesticide exposure during occupational use. Almost 1.3 billion workers worldwide suffer from occupational injuries from the use of pesticides and are occupied in agriculture. PPE has to be used for minimizing pesticide exposure in workers, as it is found that PPEs are important for workers in all Agrochemical applications.

Conclusion

PPE must be used to minimize the adverse effects of pesticides on human health. The adverse effects of pesticides cannot be completely eliminated by PPE, yet the risk of human health can be largely reduced. Farmers need to be aware of using PPE. Primarily, farmers should be educated about the use of PPE in pesticide use. By using appropriate PPE, health expense of farmers using pesticides can be reduced.



Greenlife
CROP PROTECTION AFRICA



GOVERNOR[®] 580 SE

Pre-emergence and post-emergence herbicide. It is used to control broad-leaved weeds and annual grasses in non cropped areas.

Area: Non-cropped areas

Weeds: Broad-leaved weeds
Grass weeds

Rate: 2.5L/ha in 1000L of water.
(50ml in 20L of water)

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**WHEN THE REST ARE SANITIZING AND STAYING AT HOME
YOU ARE BUSY ENSURING THEIR STOMACHS REMAIN FULL**

Thank You Farmers

