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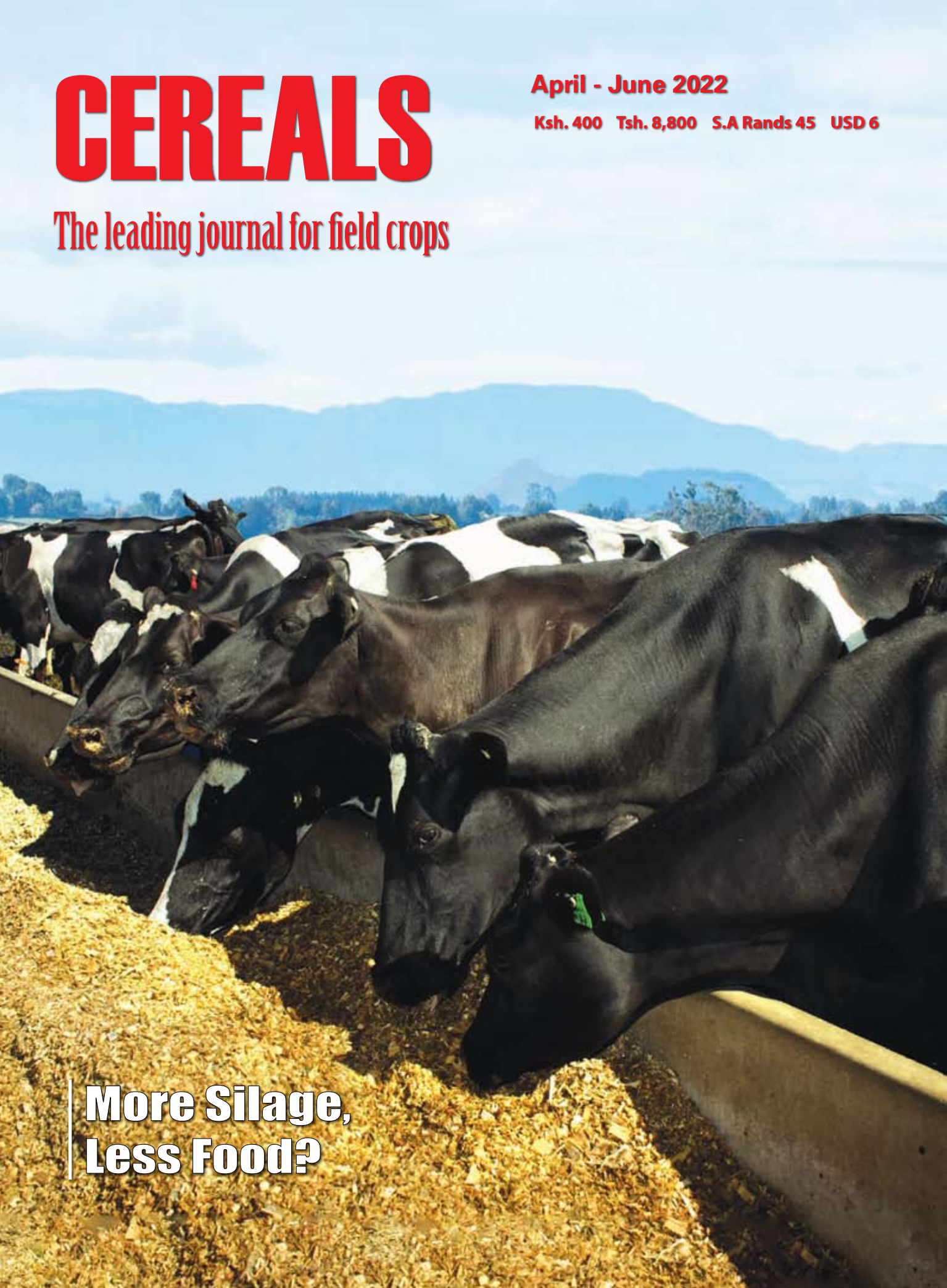

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Editorial

Get more from a hectare of maize

Chopping down a maize crop before it is ripe might sound unwise. But farmers say it makes perfect sense – particularly as worsening drought in Kenya makes it harder to get a normal maize crop to harvest.

On the flip side, during the past decades Kenya dairy farms have intensified, this calls for the need for farmers to milk more cows per hectare and produce more milk per cow. This has increased feed demand per hectare at a greater rate than pasture supply and as a consequence, there has been a move towards farm systems that strategically use silage.

Maize silage is a proven supplement and the ideal partner to Kenya's pasture-based dairy farm feed systems.

Maize silage yields are high and local research shows they are increasing each year. Growing a maize silage crop is a great way to get more dry matter off your lowest producing pasture paddocks. Alternatively you can dedicate an area of your farm to silage production and you will find that the combination of maize silage plus the annual crop can produce more than double the yield of a typical pasture paddock.

One of the biggest drivers of on-farm profitability is the amount of feed harvested from every hectare. This is the reason farmers have to get the right hybrid for pasture. A good silage hybrid must start out as a good grain hybrid. Therefore, selection of a good hybrid would entail; starch content and dry matter yield. In addition to the right agronomic traits.

Get the right hybrid and enjoy your reading

Masila Kanyingi
Editor

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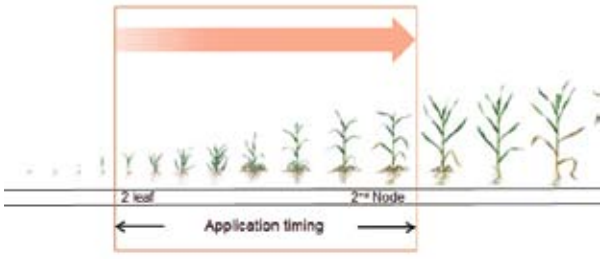

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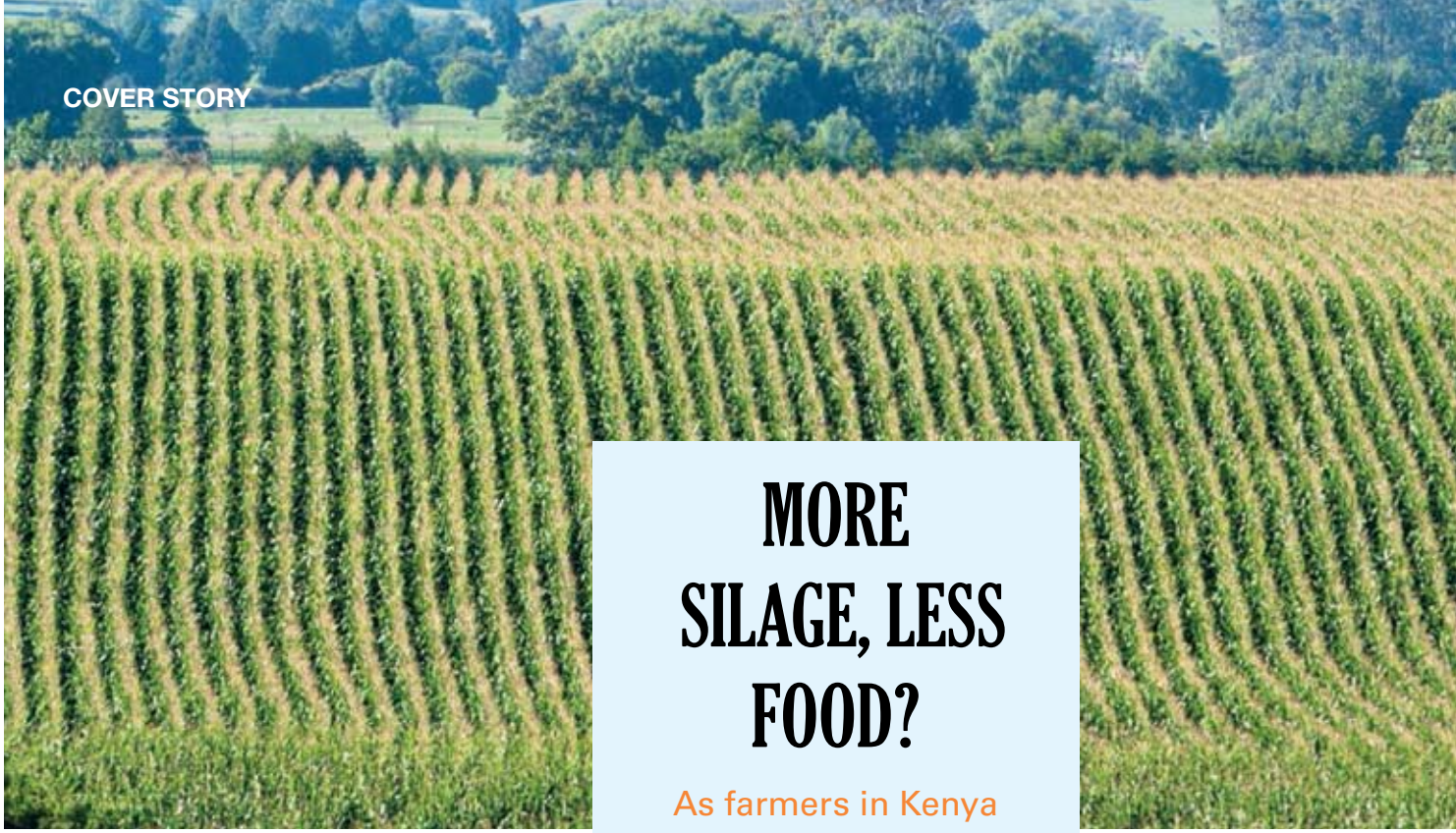

MORE SILAGE, LESS FOOD?

As farmers in Kenya chop maize for cattle feed, food security worries continue to grow. However the practice seems to be growing at a very high speed. To understand the reasons, *Cereals Magazine's* Mary Mwende spoke to Mr. Nicholas Mbatha (below) an agronomist with Corteva Agriscience.

Mr. Nicholas Mbatha

"Why silage maize grain and not normal maize grain"

She asked. Eloquently, Mr. Mbatha answered, "The production cost of growing maize for grain is high with little returns compared to that of silage maize. In Silage maize growing, nothing goes to waste, i.e. the cobs, the kernels, the stalks. In comparison, time taken from growing to harvest is short. Lastly, normal maize is subject to post harvest loses."

Technology

Living in an evolving world means that technology and innovation is an extensive field that is also dynamic. Feeding livestock has never been this easy in the 21st century, bearing in mind that animal feeds contribute a larger percentage to the well-up and out-put of animals especially the livestock.

Regardless of drought and unstable climatic conditions, farmers have always found alternative ways to their animals feed if not to supplement their diets. Maize Silage is one of such milestones and it has by far proven to be the best animal feed especially to dairy farmers who have so far had an experience of the product first hand. With the help of agronomists, agrochemicals and research institutions, farmers have been provided with adequate information and silage maize hybrids that are of good quality specifically adapted to climatic conditions of particular regions.

Silage is basically fermented fodder/Forage. Especially made from the high moisture-green foliage crops such as maize. Forage here refers to crops, annual or biennial, which are grown to be utilized by grazing or harvesting as a whole crop. It can be fed to cud-chewing animals such as goats, sheep and Cows. Ensilage on the other hand is fermentation and storage process of the silage. The crop goes through an array of processes during the ensiling process.

The things that take place during the fermentation process determine the quality and quantity of stored feed that will be available at feed out. There are three interacting factors that determine the resulting silage quality and they are; chemical

composition of the plant, air exclusion and bacteria. The air in silage is controlled by the size of the chop, moisture content, packing, silo size and extent of sealing.

Choice of Quality Silage Hybrid (Seeds)

In light with research, a good silage hybrid must start out as a good grain hybrid because you cannot overcome lack of starch (>90% digestible) with small increases in fiber digestibility (60-70% digestible). It is also worthy noting that, not every grain hybrid makes a good silage hybrid because they may be too short and not deliver the desired stover yield

Therefore, selection of a good hybrid would entail; starch content which is energy dense component of the plant and influenced heavily by harvest maturity of the kernel and dry matter yield which is determined by plant height at the ear (Biomass yield) and starch (grain content). In addition, agronomic traits such as maturity, ability to withstand stress emergence during germination, climate-tolerance, and disease resistance, harvesting stage among other traits are key.

Factors to Consider in Growing silage Maize

*Drainage-*Maize does not perform well in waterlogged soils. This can reduce maize yield and also impact on silage quality, palatability and stock health. Drain areas with water ponds to allow earlier cultivation, better weed control and reduction in nutrient leaching.

Soil Test- Always do soil test to determine the most suitable fertilizer and lime input. Fertilizer requirements will vary greatly depending on the history and fertility status of the farm.

Maize Hybrid- It is important to choose the correct maize hybrid for your area and farming system.

Weed and insect control- Weeds compete strongly for sunlight, moisture and nutrients, therefore reducing production and quality. Grass weeds are most competitive and must be controlled early.

Factors to Consider in Harvesting of Silage Maize

Maturity- Maturity can be monitored by kernel milk line development. The milk line is a visual division between the yellowish/whitish color of the seed coat (bottom of the kernel) and the whitish color of the seed towards the tip of the kernel. To maximize quality, maize should be harvested for silage when the kernels are ¾ milk line (dough stage). Between these stages, starch content is rising and fiber digestibility is in an optimum range. The moisture content should be about 65% for the stalk and 35% for the grain.

Harvesting corn at lower-than-ideal DM brings about issues such as; Crop not achieving maximum starch deposition and sub-optimal energy and dry matter losses. In addition, silage will produce effluent (and greater storage losses due to effluent feed value) Farmers would also expect higher risk of butyric layers within the silage, protein degradation and greater likelihood of overly fermented silage

Chop Height – should be between 4 to 8 inches, or 10cm

Chop Length - A short chop length allows high packing density and reduces air infiltration into the silo, while a longer chop length adds effective fiber in the diet. The correct chop length for maize depends on whether the crop is harvested conventionally, with or without a kernel processor (KP), or with a shredding processor.

Kernel Processing - Kernel processing influences the energy available in the rumen. Much of the advantage of processing maize silage is due to better kernel breakage and, therefore, higher kernel processing scores (KPS). The higher the dry matter, the more important it is to

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adequately process the grain.

The Ensiling Process

Phase 1: starts at harvest and under ideal conditions of moisture, chop length, and firm packing lasts only a few hours. In this phase (aerobic phase) live plant tissues present in the filled silo continue cell respiration due to plant enzymes and aerobic bacteria (oxygen dependent) present that uses the starch and oxygen

thus releasing Carbon dioxide. The process goes on until the oxygen within the silo is depleted.

Phase 2: Here, oxygen is depleted. Hetero-fermentation occurs. Therefore, the bacteria that do not need oxygen Enterobacteria - (anaerobic) start using the starch in the plant material producing lactic acid, propionic and acetic acid among other organic acids. This goes on for about 48hours-72 hours contributing to a rise in temperatures inside the silo by the fermenting crop to about 90C, then the pH too drops from 6.0 -5.0.

Phase 3: After around 96 hours, the silage reaches a maximum temperature. The bacteria present transitions from aerobes and acetate tolerant bacteria to lactic acid producing bacteria. The potential water loss and nutrients is at its peak.

Phase 4: From Day 5 to Day 21, lactobacilli and streptococci bacteria are present and they convert carbohydrates to lactic acid, thus a drop in pH to 4.0. Homo-fermenters predominate. There's a minimal cool down of the silage at this point.

Phase 5: In this stage, the silage is stable and remains in good quality for a long time as long as oxygen does not penetrate the silage. Still, another aerobic phase is bound to set in as the silage is removed from the silo.

Ensiling inoculants that are added during the silage fermentation process aid in;
- Reducing dry matter loss
- Reducing aerobic losses at feed out
- Improving bunk life
- Improving silage feeding quality
- Reducing overall feed cost
- Improving fiber digestibility
- Reducing protein degradation
- Conserving crop sugars

Benefits of maize Silage

Maize silage allows farmers to enjoy maximum benefits. It is advisable to any dairy farmer to take this advantage. This will optimize the stocking rate to achieve a higher pasture harvest even in a bumper pasture-growing season. As pasture levels fluctuate you can feed maize silage to maintain animal intakes.

It will also fill feed deficits by having maize silage on-hand; a farmer will never be short of feed. This will enable you to fill feed deficits throughout the season and lift per cow production.

Feeding maize silage in the dry season enables farmers to increase the number of cow milking days. Likewise, high energy, high starch- Maize grain contains more starch and energy than other cereal grains and has a relatively high level of bypass starch.

The digestibility of maize remains fairly consistent throughout the growing season. As the crop matures, the quality of stem and leaf declines, but this is offset by the increase in grain in the cob, which is highly digestible and high in starch. This is why harvesting at the correct stage is essential to maximize nutritional value. Cattle and sheep adapt to it easily in rations. It is Palatable and has a consistent feed value.

Corteva Agriscience's Maize Hybrid Varieties

There has been a myth that yellow varieties are the best. However, Mr. Mbatha demystifies and rescinds this myth as some white varieties are also performing well. Corteva boasts of some of the best varieties in the country among them PAN 691-Medium altitude to High altitude suitable for Kiambu, Nakuru,Eldoret, Bome t,Bungoma,Nandi,Kitale,Kericho. They also have 3OG19-Medium-Medium wet suitable for Embu,meru,Nakuru,Migori,Kakameng a,Bungoma,Busia etc. For the Lowland-Medium they have PHB3253 suitable for Machakos ,Embu, Migori,Homabay, Meru, Embu etc. PAN 14(Yellow hybrid) is a Medium altitude which can do well in Meru, Embu,Nakuru,Migori,Siaya,Busia etc.

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Maize Granaries of Kenya

Your ability to analyse a situation is your biggest effect

Farmers tend to market their maize crop immediately after harvest in order to meet their financial obligations and to prepare for the next season. Due to this practice, maize supply becomes artificially higher than the demand thereby forcing prices to drop; only to increase within four months after selling to discuss this *cereals magazine* interviewed several growers in Trans Nzoia County.

Briefly discuss Maize growing in Trans Nzoia County and the country as a whole?

Maize farming in Trans Nzoia has been the main activity since colonial times and has always been described as the maize granaries of Kenya. The difference between now and then is that the big farms that used to produce bulk of maize are no longer there as most have been sold and sub divided in to small plots that can only produce subsistence crop for families and little as commercial crop. Big parastatals like ADC and Kenya Seed have set foot in Trans Nzoia as commercial producers of maize seed and maize farming but were run down and most of their farms subdivided to individuals as settlement schemes.

These actions have created shortages of supply to the buyer, the National Cereals Produce Board of Kenya. Trans Nzoia enjoys suitable climate, soils and rainfall patterns that enable maize to do well and produce optimally. In the country as whole maize growing is practiced everywhere as it provides the stable meals of most Kenyans but nowhere else it is done in the scale of Trans Nzoia. The weather patterns favour other crops like wheat, coffee and tea but maize growing is the most practiced.

Granary

What challenges are maize farmers facing currently? What do you think would be the tentative solutions?

Trans Nzoia has no big lands, costs of implements and inputs are high due to rising cost of fuel, and dollar rates.

The main challenges are inputs especially availability of good seeds specific to the altitude and prevailing weather pattern as it varies from different altitudes and locations within Trans Nzoia county. Some of the recently introduced high yielding seeds have come with challenges such

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Cost of Maize Production – Aggregate for Areas Visited

	Large Scale	Small Scale
Maize yield (bags/acre)	**26**	***17.4***
Sale price per 90kg bag	**2,333**	**1,930**
Total revenue/acre (TR)	**60,667**	**33,582**
Land preparation	5,500	3,960
Planter hire	1,167	1,175
Seed	1,500	1,500
Fertilizer	11,499	5,560
Other intermediate costs	**6,210**	**2,086**
Land rent (LR)	**8,000**	**7500**
Labor (family & hired)	4,564	5,842
Working capital (WC)	**3,075**	**2,210**
Total production costs with LR & WC	***41,515***	**29,833**
Cost per bag with LR &WC	***1,597***	***1,715***
Breakeven yield (90kg bags)	***18***	***10.4***
Profit per bag (Ksh) with LR & WC	**737**	215
Profit per bag with LR &WC (%)	**46%**	***13%***
Cost per bag without LR & WC	**1,171**	***1,156***
Profit per bag (Ksh) w/o LR & WC	**1,162**	**774**
Profit per bag w/o LR & WC (%)	**99%**	**67%**

as diseases, easily attacked by Borers as grains, and rots while still on stalk on the cob. Other challenges are easy availability of subsidence fertilizer from the Ministry of Agriculture through the NCPB, which for long has been riddled with corruption and adulteration of the fertilizer.

Farmers are therefore forced to seek alternative sources that are traders who rip them off as they sell at exorbitant prices and quality not assured. Farmers also have nowhere to sell their produce but to the middlemen who exploit them and buy at cheap price and sell to millers at higher prices. Farmers face bad roads to their farms and transportation of input and harvests are hindered logistically creating possible crop failure due to delayed planting and grain degradation through borers or rotting.

Solutions

1. National Government Level

The distribution of inputs should be managed to benefit farmers through easy accessibility at sub county levels rather than the main NCPB stores. The government should subsidise both seeds and fertilizers to cushion farmers from high cost of production. Regulate price of diesel and oils that are directly used for maize growing (ploughing, Planting and harvesting). Create regulation that removes the middlemen from dealing with maize and avail capital to purchase maize directly from farmers.

2. County Government Level

The logistics to farmers land should be improved and ensure extension officers are working through educating farmers on best farming practices and which seeds suit their areas. Ensure local traders sale genuine fertilizers and at recommended prices as they regulate the trading licences. Assist the research centres (KALRO) to carry out trials on various imported seeds before releasing to the farmers to avoid diseases and inferior quality maize which can cause loses. Purchase farmers produce directly at recommended price and store for sell to the millers or other distributors. This will cut out the middlemen who exploit farmers. Regulate exit of produce from Trans Nzoia to other counties without paying cess to the county. Also ensure cheap imports from neighbouring countries do not find their way into the county affecting the prices for the local farmers. Assist farmers through extension officers with weather patterns and forecast in order to plant in time and harvest before rains.

3. Investor level

For maximum yield and income, the farmer must ensure they maximise on the good practices and avoid cost cutting. Maximum recommended fertilizer, certified seeds, good land preparations and timely agricultural practices. (Land preparation, planting, weeding, top dressing, and Harvesting). Farmers should also ensure the

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storage of the produce is suitable and dried to the recommended moisture level and coated with insecticide to prevent borers from destroying the grain. This will enable them hold on to their maize until prices are suitable to dispose of their produce. Avoid selling to the middlemen and form cooperatives which can be their vehicle to bargaining.

What would you advice maize farmers to ensure they earn maximum profits?

Farmers must follow the recommended farm practices without diverting to cost saving in all cultural practices. They must abide by the recommendations given by the experts as this is the only way to maximise production. From land preparation, certified seeds fertilizers, top dressing and weeding should be done in timely and proper way. Avoid phone farming where the farmer is far away and only give instruction to workers.

Farmers must follow the recommended farm practices without diverting to cost saving in all cultural practices. They must abide by the recommendations given by the experts as this is the only way to maximise production. From land preparation, certified seeds fertilizers, top dressing and weeding should be done in timely and proper way.

Maize farm

Avoid selling maize to the middlemen and store their maize until prices are acceptable. Seek opinions and advice from old farmers who have experience and expertise in maize farming as they posses' wealth of knowledge on weather patterns for proper timing and proper seeds and fertilizers. Avoid buying inputs from unrecommended dealers as fake products can cause losses.

Small scale farmers can form cooperatives or unions to advocate for the prices of inputs, produce prices, and government subsidies. Farmers can join farms to make substantial acreage for better per capita yield.

Stalk borer: Causes seriuos damage

Currently, the country is facing a serious famine, Maize being the staple food in the country, Do you think the country is not producing enough?

The country has the potential to produce enough but the challenges facing farmers impedes the maximum production from being achieved. Most farmers have leased out their farms to brief case farmers who have no idea what to do to get better yields. Big plantation farms have been subdivided into smaller farms that cannot produce for commercial sales. For sure the country is not producing enough to satisfy demand but it is because the potential has not been fully implemented. If the vast lands like wheat in Narok would be exploited for maize production then surplus would be realised. Hoarding by millers who have several silos in different counties also creates shortages which can be a way of making profit through value added products like shifted maize meal. Non-governmental organisations distributing food to the famine areas would rather import from

other countries than buy from farmers. For example we see bags of maize with WHO, USAID, people of china etc, yet the farmer has nowhere to sell their maize. I would say this shortage is created to induce importation of maize.

What should be done to prevent these cycles of famine?

The government should support farmers but above all have food reserves as it was in the past where NCPB was the custodian of all grains reserve and distribution was only from this organisation. The government would therefore have food security at their fingertips and control distribution and imports. Due to poor produce management it has result in farmers abandoning the growing of maize by planting alternative crops like sugarcane where the returns are more attractive and guaranteed. Bottom line is to assure farmers of good return to their effort and food security will be guaranteed. Prevent cheap imports that make farmers loose market for their produce.

Irrigation has been prescribed as the way forward, do you agree?

It can only be possible if the cost of investment can be paid off with money generated from the maize. At the present rate the cost of running irrigation will not be feasible. Already with rain fed growing it is hard for farmers to break even, then it will be harder with irrigation cost. When this has been tried in Galana it was concluded production has to be 40 to 50 bags per acre to make financial sense. The only effective irrigation is centre pivot system which is quite costly to install and to run. Secondly it needs a vast piece of gentle sloping land to run properly. It might be good if this was introduced in drier parts of the country where there is no production to supplement the general country production. For Trans Nzoia I think rain fed still is a better option with the present price scenario.

Kindly tabulate the cost of inputs per acre.

It is variable. The cost will depend on the size of the field, production per acre and ensuring good agricultural practices are well adhered to. The bigger the size of the field, and production per acre, the less the cost of production.

Approximately how much does it cost to produce 1Kg of Maize?

In view of the above, it is approximately 12/- per kg if you add land lease, Plus 10% contingency cost at 30 bags per acre yield.

Any other comments

The cost shown is based on estimates and can be higher depending on the prevailing market cost of inputs especially fuel which will determine transport and fertilizer cost. The land issue is sensitive and reserving land like ADC to produce for the national food reserve would help with food security especially during famine. Most of our dry counties with all year round rivers should be developed into irrigation schemes.

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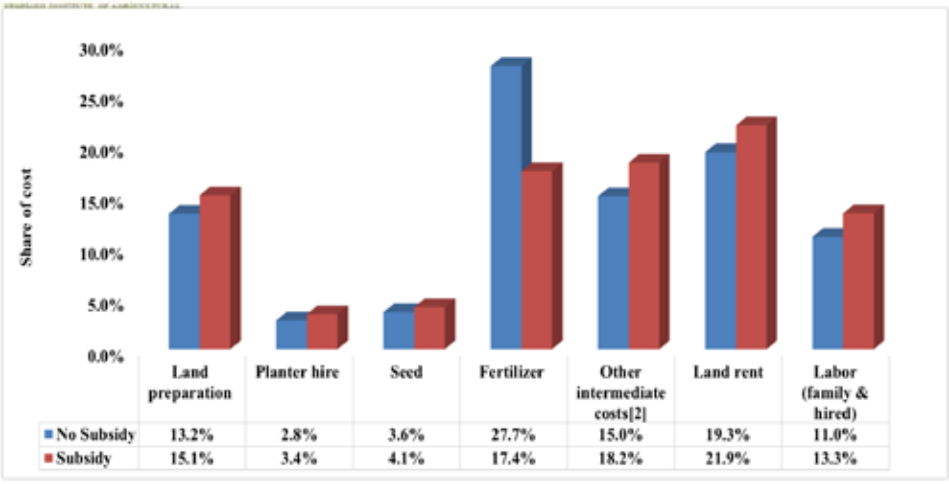
Share of cost components -Large Scale Production system



	Land preparation	Planter hire	Seed	Fertilizer	Other intermediate costs[2]	Land rent	Labor (family & hired)
No Subsidy	13.2%	2.8%	3.6%	27.7%	15.0%	19.3%	11.0%
Subsidy	15.1%	3.4%	4.1%	17.4%	18.2%	21.9%	13.3%

Government Commissions Water, Farming Projects in Nyandarua

Agriculture CS Peter Munya and former Water and Sanitation CS Sicily Kariuki have reiterated government's commitments to enhance service delivery and ensure implementation of crucial projects meant to boost farmers across the country. The duo said the government was working round the clock to ensure meaningful development projects are realized countrywide.

They spoke at Ol-Joro orok Constituency where they commissioned several water projects and gave out farming tool kits to farmers to boost their activities.

The duo also launched the Kagongo Wendani Irrigation project in Weru Ward, expected to serve over 800 households, which was funded by the Ministry of Agriculture through the Small-Scale Irrigation and Value Addition Project (SIVAP).

Munya also launched the One Million Kitchen Gardens Plan that targets households and schools across the county, an initiative that is part of the economic recovery strategy to mitigate the effects of Covid-19 and boost income.

"The tool kits will help farmers' groups to start kitchen garden activities in an effort to boost food security as most parts of the country continue to experience drought as a result of prolonged dry spell.

"The government is also committed to re-introducing 4-k clubs in schools where learners will also be trained on modern farming technologies to caution on food safety," said Munya.

The initiative will see pupils from primary schools taught on how to grow crops through 4K Clubs, a clarion call to help the country be food secure.

Popular farming activities include keeping rabbits, chickens, goats and growing horticultural crops for lessons to enable schools generate some income from them.

On her part, Sicily Kariuki noted the government had already invested in water projects worth over Sh3.6 billion since 2020 in Nyandarua County alone, a commitment she observed will help support residents get access to clean water.

"The government has done a feasibility study on the Pesi mega water project that is expected to be launched in Ndaragwa Constituency, and now what remains is designing and funding of the project that is meant to serve residents from Nyandarua, Laikipia and Nyeri Counties.

"This will boost water supplies to other water projects that have already been initiated in this area," said Kariuki

Meanwhile, Munya said the government has established a task force to look into ways of improving potato farming in the country.

He said the task force would be unveiled soon and amongst its terms of reference would be to find ways of ensuring that potato farming is profitable.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DHIBITI NA ANGAMIZA FALL ARMYWORM KWA KUTUMIA...

Understanding the Political Economy of Maize in Kenya and Expensive Supplies

By Timothy Njagi Njeru

Farmers have perennially agitated for higher prices due to high production costs. In response, government has intervened by setting maize prices, usually above market rates, for the strategic food reserve. The strategic food reserve was set up to stabilise food supply and food prices. On the other hand, consumers want to buy cheap maize flour, squeezing the government between producer and consumer demands.

Maize is the cheapest source of calories among the cereal grains, making up about 65% of total food calories consumed by households in Kenya. To meet this demand, maize is produced on 40% of the total crop area – mainly by smallholders.

Kenya's annual production target has been 40 million bags or approximately 3.6 million tons. However, over the past decade, the average production has been well below 40 million bags, with the exception of 2012, 2013, 2015 and 2018. Last year saw the highest production of 46 million bags.

At the same time, demand is growing driven by population growth and stands at above 50 million bags in 2022. It has been projected to reach 60 million bags by 2025.

The gap between demand and domestic production has placed maize at the centre of the food security debate.

This year's projected production is unlikely to hit the 40 million target. Given this, there is an on-going debate on whether to import maize from outside the East African Community region to plug the gap.

Importing from within East African Community is the first logical step in view of a 50% common external tariff designed to protect local producers. However, countries can seek exemption and import duty free from elsewhere when a pressing need arises. Kenya also has a total ban on GMO products meaning that it can only import from GMO free countries.

The import debate has increasingly taken a political tone with politicians from maize producing regions in Kenya totally against any imports. They argue that imports would likely depress producer prices in the middle

of the main season for harvesting. Farmers usually sell immediately after harvest.

But government's response is that there's a need to import given the expected shortfall.

It is my position that a key sticking point is contested data, with different stakeholders providing different numbers that support their arguments. The Ministry of Agriculture is the institution mandated to generate data on food security. But it has capacity gaps and doesn't do this well.

Tegemeo Institute, where I work as a research fellow, is recognised as a credible source of data in agriculture. However, the Ministry of Agriculture can decide whether or not to use the data, which it does on and off.

The current debate is stirred by interests among the political class, elite business people. The use of evidence is not in their interest.

The production landscape

Policies on maize have always been contested in a market characterised by lobbying from farmers, millers, and consumers.

Ideally, farmers and millers will make a reasonable profit and consumers will get affordable prices. But the Kenyan case is far from ideal. Farmers have perennially agitated for higher prices due to high production costs. In response, government has intervened by setting maize prices, usually above market rates, for the strategic food reserve. The strategic food reserve was set up to stabilise food supply and food prices.

On the other hand, consumers want to buy cheap maize flour, squeezing the government between producer and consumer demands.

Challenges galore

Despite the importance of maize, productivity has stagnated and is now about only 1.6 tons/ha, leaving Kenya trailing behind other maize producers on the continent. Ethiopia, for example, is twice as productive, with a productivity of 3.7 tons/ha. Ethiopia managed to attain high productivity through improving access to extension services, use of modern inputs and improving rural infrastructure.

The productivity of Kenyan maize

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farmers has stagnated because farm sizes have declined to uneconomical sizes. This has mainly been caused by population increase and urbanisation, which have led to increased land subdivisions in rural areas. In addition, Kenya's soil quality is declining while smallholder farmers often plant unsuitable varieties, have low use of complementary inputs, and sub-optimal use of inorganic fertilizers.

Added to all these are the effects of unpredictable and unfavourable weather patterns compounded by limited access to water for irrigation, and increased pest and diseases prevalence such as the Maize Lethal Necrotic Disease and Fall Army Worm.

Most farmers rely on public sector extension systems. Without access to proper extension services, Kenyan farmers have no access to information on how to improve productivity. There are also market failures, exemplified by the poor distribution between deficit and surplus regions. This means that the market is unable to signal or provide incentives for traders to address supply issues. This implies that the government must intervene to correct the market failure.

Yet there is little to show for government attempts at resolving these issues over the years. Key interventions in the past included a fertiliser subsidy, food subsidy, and producer price support.

Is there a deficit?

In the past controversy, millers have accused farmers of hoarding maize to drive prices higher, a claim which farmers reject. Farmers and millers disagree on what is the level of maize held in storage.

More alarming are the different positions taken over the available maize stocks by the Ministry of Agriculture and the Strategic Food Reserves board, two institutions key to maintaining food security in the country.

The outlook suggests a deficit for the full season. Government recently estimated a deficit while clarifying that it has not authorised any importation. The ministry is doing the right thing in terms of preparedness based on recent history. However, this pronouncement was met with scepticism especially by political leaders from the maize producing regions who have insisted the data is inaccurate.

The size of the deficit matters because it determines whether maize can be imported from outside the East African Community. Like Kenya, other East Africa Community countries also experienced bad weather. Their production is expected to be below normal production. However, early indications are that Tanzania has sufficient stocks to fill the deficit that Kenya faces. Moreover, additional stocks could come from Uganda.

When to import

It is only after factoring in the inflows from the region that a decision can be made whether imports from outside the region are needed. And such a decision should be guided by three principles. First is verifiable data on the deficit, second is the timing of the importation which should not coincide with the harvesting season in Kenya and, third, is to ensure decisions to import should not be delayed until the stock in the country is depleted.

Finally, all these decisions and processes should be transparent. This would include making public the importers and volumes permitted for importation.

Kenya Should Invest in Canola and Sunflower as Alternatives

Different varieties of cooking oils.

Catherine Wairimu inches along the aisles of a supermarket some 20 minutes' drive from the Nairobi central district. Her face flinches after stopping at the cooking oil section and glancing at the prices.

Prices of crude palm oil have jumped by 33 percent due to the Ukrainian crisis, as sector players initiate efforts to urge the government to contain a further rise in cooking oils.

Manufacturers of cooking oil are now buying palm oil, the main raw material at between $1760 (Sh200,534) per metric tonne and $1980 (Sh225,522) after the escalation of Ukraine-Russia conflicts.

Kenya is a large importer of vegetable oils such as sunflower oils, soybean, corn oil and commonly used crude palm oil mainly from Malaysia and Indonesia, which produce more than 90 percent of global supplies.

Cooking oil is also bought in bulk for industrial use in the making of detergents and food stuffs such as bread.

Weak production over the last six months in Malaysia due to labour shortages coupled with flooding has seen Kenya depend on the Indonesia's palm oil. Soybean oil supplies have been affected by the two-year drought in Argentina and Brazil due to La Nina. Ukraine, which accounts for 76 percent of global sunflower oil exports has cut its supplies.

The disruption of alternative oil supplies - sunflower and soybean oil has fuelled a rally on palm oil from Indonesia. As result, Indonesia is enforcing a 20 percent retention of all planned oil exports to be sold in the domestic markets to control their prices, affecting import volumes to Kenya.

This is the time to think outside the box and ask, can Kenya produce enough Canola and Sunflower to cater for the oil markets.

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Canola farm

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Kenya Needs a Canola Innovation Strategy

There is need to develop a Canola Innovation Strategy, outlining an aligned value chain vision, from farm to customer, for near-term innovations needed to do even more for our economy and our environment. The strategy should articulate a path for innovation and research to achieve the industry's intended goals.

Canola's position as one of the world's most important oilseeds and Canada's most valuable crop must be built upon continued investment in research and innovation. It needs constant innovation to increase productivity per acre, maintain high demand for its oil and protein, and continue to improve its environmental footprint.

The Canola Innovation Strategy should be developed through in-depth consultations with stakeholders, including canola grower organizations and companies along the value chain, to identify innovation focal points to achieve these objectives. If possible must focus on four key pillars – performance, precision, protection and product, and calls for a predictable and science-based regulatory system.

These discussions will help identify current gaps and opportunities in various aspects of canola innovation, pointing the way to our priorities especially research funding for the Next Policy Framework for agriculture and other funding opportunities. Through the vision of this strategy, growers, government, universities and private researchers can collaborate to increase the likelihood of success. The Innovation Strategy will provide the direction and framework for that collaboration.

Processed Canola oil

The four key pillars of the strategy may be summarized as follows:

1. Performance

Increase productivity and meet current and future customer needs for oil and protein. Remain a top crop for Kenyan producers, sequester more carbon in the soil, reduce greenhouse gas emissions and contribute to biodiversity.

2. Precision

Use current and new field tools and technologies to increase productivity and reduce the environmental footprint of canola.

3. Protection

Protect the crop from pests and other threats to productivity, including climate change factors, while also protecting markets.

4. Product

Ensure Kenya's canola industry can supply current customers while also being flexible to adapt to changing market demands for oil, meal, protein and fuel.

Kenya needs a full value chain organization representing canola growers, processors, life science companies and exporters. The strategic plan will ensure the canola industry's continued growth, demand, stability and success.

Why Canola Oils

Pure Canola (rapeseed) oil has a subtle nutty flavour, making it ideal for dressings, roasting, frying and baking. Cold pressed Canola Oil from the fertile farms around Mt Kenya has not been treated with any heat, which means that the health benefits – such as low saturated fat, and

high omega 3 – have been preserved… leaving you with nothing but a naturally healthy & local product.

Rapeseed (Canola) oil is the healthiest of all commonly used cooking oils, and comes from the seeds of the canola plant. It is lowest in saturated fat, high in cholesterol-lowering mono-unsaturated fat and the best source of omega-3 fats of all popular oils. The seed is harvested from pods that are filled after beautiful yellow flowers form on the plant.

Its polyunsaturated fats are essential omega-3s – which may help prevent heart attacks and strokes – and omega-6s – which are important for the brain and essential for the growth and development of infants. It is a rich source of vitamin E.

Government must unveil a strategy to commercialize oil crop farming

Key players who manufacture edible oils, have resorted to importing Sunflower and Soya beans to sustain processing demand, nevertheless lack of a sustainable market for farmers needs to be addressed before farmers are persuaded to plant the oilseed crops. There is no way you will convince a farmer to plant an oilseed crop which fetches between Sh.25 and Sh.50 a kilo yet they know that the same kilo of beans will fetch twice the amount. There is need to streamline the market in favour of farmers.

However, enhanced Productivity of Sunflower and Soya Beans for Smallholder Farmers' production of liquid cooking oil from maize was "critically unreliable" as the crop is the country's staple food for most households.

Ministry of Agriculture formulated the crops (nuts and oil crops) regulations, 2019 aimed at streamlining oversight and better management in the sub sector. The regulations promote value addition of various nuts and oil crop commodities through agro-processing while contributing to the realization of the manufacturing pillar and creating more jobs in the nuts and oil crops sub-sector.

Devolved units may use both the policy and its implementation strategy as a reference point for direct interventions at the local level, especially the mobilizations and providing agricultural advisory services to oil crop farmers, promoting sector development and regulation of the industry at the county level.

The full implementation of the regulations will guarantee oil crop farmers diverse market access and improved prices while ensuring that the growers and their organizations access quality planting materials and market information, enhanced advisory services and support.

"Processors of oil crop products will be assured of consistent and reliable supply of quality raw materials for better business planning and operation and legal recognition of the many businesses now viewed as informal or illegal once the regulations are fully implemented.

Sunflower

Partnership with manufacturers

The BIDCO Africa Chairman, Vimal Shah states that his company has contracted over 25,000 small scale farmers in Nakuru and other parts of the country to grow Sunflower and Soya beans.

"We link our contracted farmers to Kenya Seed Company and other renowned seed breeders and suppliers for best quality planting material that would yield optimum results for both the farmer and the company," said Shah.

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He said the company requires over 10,000 metric tonnes of Sunflower and Soya beans annually, but local farmers only supply an estimated 5,000 metric tonnes.

"Soya beans, sunflower and maize are the main raw materials in the manufacturing of liquid cooking oil. We need to encourage oil crop farmers to adopt market oriented farming through precision planning and good agricultural practices," said Shah.

"BIDCO Africa pays it's contracted farmers cash on delivery of required quality sunflower and soya beans. We have no stories of 'come tomorrow," he said.

BIDCO Africa and Land O' Lakes, a United States of America Farmers' cooperative and manufacturer of animal nutrition products unveiled a Sh. 1.2 billion animal feeds factory in Nakuru.

"We need at least 36,000 metric tonnes per year of both soya and sunflower to run at full capacity. We are underutilizing our machines, which run and stop when there are no more raw materials. There is a ripe and direct market for oil crop farmers, which they must take advantage of immediately," he said.

The Nakuru Deputy Governor, Dr. Eric Korir (Left) with the BIDCO Africa Group Chairman, Mr. Vimal Shah

Soya beans

Sunflower grows well in areas with sparse rainfall, and the soil should be slightly acidic with a pH of between 6.0 and 7.5. Two main categories of sunflower-Hybrid Variety and Open Pollinated Variety (OPV) are grown in the country. Several hybrid varieties which include Sunbeam, Mammoth, Autumn Beauty, Teddy Bear and Kenya Fedha, are grown in different parts of the country. They mature in three to four months.

Hybrid varieties have higher oil content and better yields per acre averaging 25 bags, while Open Pollinated Varieties have an advantage that their seed can be recycled.

Sunflower by-products such as sunflower cake have a ready market in the animal feeds manufacturers' industries. Farmers can make more profits if they incorporate value addition in the enterprise as compared to selling the raw seed.

Sunflower, unlike maize does not require heavy rains, it's planted for two seasons and its proceeds are way higher, adding that unlike other crops that are weather-dependent sunflower survives in dry areas.

It is also not expensive to produce high quality and quantity yields if a farmer follows the instructions of the officers.

Most oil crops are used for rotational purposes and conservation farming. Oil crops have been found to reduce erosion, improve soil water retention and lead to fewer weeds, pests and diseases. Oil crop yields are 25 percent more compared to other crops.

A farmer needs about Sh.24, 000 to produce between 500kgs and 1000kgs of soya per acre-if well managed. At least Sh.12, 000 invested in an acre can yield between 300kg and 1,200kg of sunflower.

Soya beans planting seeds cost between Sh.150 and Sh.200 per kilo while sunflower of the same amount can be bought at Sh.300.

Micronutrients in Cereals

Victoria Nandwa is a Technical Agronomist - Crop Nutrition, Amiran Kenya Ltd.

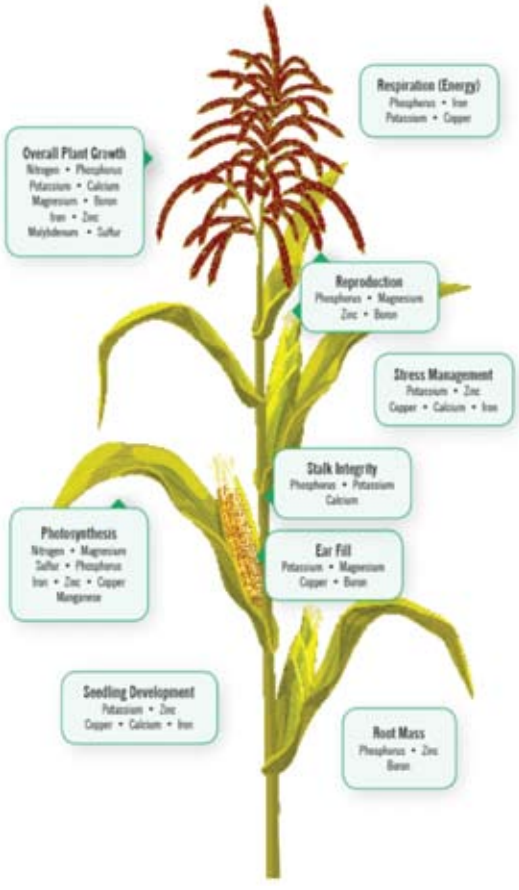
By Victoria Nandwa

Micronutrients are essential plant nutrients that are found in trace amounts in tissue but play an imperative role in plant growth and development. Of the 17 elements essential for plant growth, eight are micronutrients: boron (B), chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), zinc (Zn) and nickel (Ni).

Since farmers concentrate mostly on macronutrient application, excessive amounts of micronutrients are a very rare occurrence. On the other hand, if deficient, crop growth and quality will be affected.

Functions of micronutrients

1. Most micronutrients are part of the enzyme systems of plants.
2. Micronutrients play important roles in redox reactions
3. Micronutrients play important roles in photosynthesis.
4. Micronutrients are important in reactions such as N fixation and Protein synthesis.



As growth in all stages is dependent on micronutrients, we must be aware of their balances in the soil and their availability to the plant. Without these micro elements being taken up by the plant in proper amounts and balance, yields will be limited. Amiran Kenya and Nulandis brings Tiger trace©. It is a formulation comprising of a combination of granular micronutrients containing: Sulphur (S) - 650 g/kg Copper (Cu) - 7 g/kg Iron (Fe) - 10 g/kg Manganese (Mn) - 7.5 g/kg Zinc (Zn) - 90 g/kg, that offers several improved features over conventional micronutrient sources, with improved handling, minimum to no dust and uniform sizing. Tiger Trace© is a unique micronutrient fertilizer that delivers agronomical and economical solution and provides excellent handling characteristics. Tiger Trace© provides a cost effective method of preventing micronutrient deficiencies. Tiger Trace© when used as part of a balanced soil fertility program, can provide a season-long source of iron, copper, manganese and zinc. Tiger Trace© can be applied alone or blended with granular fertilizers. Amount required should be based on agronomic recommendations from soil tests and plant tissue analysis.

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Top Dressing Fertilizer For Maize: Why Timing is Key

The key word is timing; Top dressing fertilizer works best when the timing is best (the right crop groth stage at the recommended rate.) This explains why application of urea is dependant on understanding of growth stages.

Top Dressing Fertilizer For Maize

Nitrogen applied at the 3-4 leaf stage with a broadcaster leaves nitrogen vulnerable to leaching when the crop does not require it.

Nitrogen and other nutrients are not taken up at a constant rate through the crop life.

A summary of the important growth stages and the amount of nitrogen in particular that the crop takes up at each stage.

	What is happening in the crop?	Kg of N taken up
V1	Crop emerging	
V3 stage	3 leaf stage, crop established	12 kg/ha N
V6	Growing point and tassle at ground level	25 kg/ha N
V8-V10	Rapid top growth period	80 kg/ha N
V12	The number of rows of kernels determined. Rapid nutrient uptake	100 kg/ha N
R1		140 kg/ha N
R3	Little further N uptake	250 kg/ha N
R6	Physiologically mature	

Applying at 3-4 leaf stage leaves probably a 4-6 week gap before the crop is really taking up the fertilizer. Nitrogen takes time to get into the crop. In most cases, the optimum is around the 8-10 leaf stage for top dressing fertilizer for maize.

Leaf Tests are a Crucial Guide

Leaf Tests (or leaf nutrient analysis) are an important tool to take a snapshot of what is happening inside the plant. They will also highlight other nutrients and guide on;

- Whether there was enough application of phosphate in the seedbed and whether there's need to change.
- If Boron is at levels that might limit kernel numbers
- How much and how soon to apply nitrogen top dressing
- Comparing any trials in the field – has seedbed Boron or Zinc actually gotten into the plant and is it needed?

Leaf Nutrient Analysis

After deciding how much top dressing fertilizer for maize to apply, consider splitting the application.

- This reduces the risk of leaching;
- Improves application timeliness;
- As a general rule, the little-and-often approach means N is more efficiently taken up by the plant.

Which Fertilizer is Best for Top Dressing Maize?

In recent years there has been a trend among maize growers to apply Calcium Ammonium Nitrate (CAN) fertilizer to their crops in preference to Urea. The lower volatilization risk in dry soils and the perceived neutral effect on soil acidity has encouraged the trend, along with the subsidized price through the National Cereals Produce Board (NCPB).

But how accurate are these claims, and what is the best value approach for your crop? Calcium Ammonium Nitrate (CAN) contains 28% nitrogen typically and is rapidly and efficiently taken up by plants. The Nitrogen content is far lower than Urea however which contains 46% nitrogen, so the actual cost per Kg of Nitrogen is more expensive.

Cost analysis have shown that the Nitrogen in Calcium Ammonium Nitrate (CAN) costs 65% more than Urea because it is less concentrated. So even if some N is lost after applying Urea, it is still far less expensive than CAN. Applied in the right conditions to moist soils, losses are very small. In most soils the acidifying effect of Urea is minimal, and the Calcium in CAN is not in a form that is particularly available.

Maize Fertilizer Requirements per Acre

Maize can easily achieve 9 tons/ha (40 bags per acre) with the right agronomy and adequate moisture, but it does require adequate nutrition to achieve this.

The amount of fertilizer required is best calculated by multiplying the target yield in tons per hectare, by 20-25 Kg. For a 30 bag per acre crop this is 160 Kg of nitrogen.

Timing is final part of getting fertilizer right; DAP or a compound fertiliser at planting forms a good base for crop emergence, with the balance applied as urea as a topdressing. Soil Mineral Nitrogen testing can help too, by accounting for residual nitrogen in the soil profile.

And finally, top yields require accurate application. This can be discussed in detail with your agronomy contact for independent agronomic advice.

Maximizing the Performance of Urea Top Dressing

Urea remains the least expensive form of Nitrogen as compared to CAN (depends on the volatility of fertilizer bag prices). But what are the likely volatilization losses, and is it possible to go some way predicting this?

More recent work suggests that while urease inhibitors and controlled release fertilisers do work effectively, the overriding views of independent researchers show that losses from untreated urea are rarely large enough to make a coating / inhibitor worthwhile.

Looking at some trials done elsewhere, the consensus is that a maximum of 20% of applied N is lost from Urea, and usually far less (link at the bottom).
That said, in the real world there are often practical reasons for using them as we cannot always spread large acreages in perfect conditions, and if the weather forecast is wrong having some protection on the urea to reduce losses it very desirable.

Factors Affecting Volatilization Losses In Top Dressing Fertilizer

- High soil temperatures
- Low rainfall
- Moist soil surface that breaks down prills, then dries out
- Lots of surface residue
- High soil pH
- Organic Matter (correlation with Urease enzyme activity so faster conversion to ammonia)
- Windy conditions
- High lime content on the soil surface (chalk soils)

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How To Apply Top Dressing Fertilizer For Maize

Broadcaster / spinner

Pros

+ Fast and accurate
+ Minimises wheelings and therefore compaction

Cons

- Needs to be tray tested to get the spread pattern right
- Requires good quality fertiliser to get the spread
- Prills or granules can land in the leaf whorl and burn the plant
- Three point linkage on smaller tractors may not be sufficient to get the spreader to the correct height above the crop.

Side dresser with drop pipe

Pros

+ Accurate – no issue with spread pattern
+ No fertiliser prills/granules falling into leaf whorls and causing damage

Cons

- More wheelings and compaction
- Slow work rate

Side dresser injected

Pros

+ Far less risk of volatilisation with urea products
+ Accurate, and you only have to do in between every other row

Cons

- Slow work rate
- Soil disturbance, especially in notill situations. Also disrupts the herbicide layer.

Foliar urea

Pros

+ Fast and no leaching losses
+ Can combine with a fungicide in many cases
+ Often see yield responses above even a high topdressing dose. Very useful if topdressing has leached

Cons

- Prone to scorch and leaf damage
- Requires high clearance sprayer
- Requires some basic equipment to mix the product

Whatever you do, always try to apply a double and a nil (half rate) rate strip to understand the response that the crop is giving you.

Choosing a Fertilizer Spreader For Maize Top Dressing

Choosing the correct fertilizer spreader can open up possibilities for the material you spread, and importantly can help you get the job done quickly and efficiently when the application window is right…

Spreading width

This will normally depend on tramline width, but a high quality materials will happily spread to over 40 metres. Lower quality Ammonium Sulphate and Urea on the other hand is a much less expensive way of buying sulphur, but will require two passes and the AS will struggle to spread even 12 metres.

Hopper size

An important consideration for larger farms, as the option of buying in bulk 1 ton bags will soon become a reality.

Auto section shut-off

The smaller the fields and the more short work you have, the more this will pay you back in reducing overlaps and also minimizing lodging on the headlands. Everyone talks about the pros and cons of Urea vs Calcium Ammonium Nitrate (CAN) fertilizers and volatilization etc. In reality many farmers can improve their efficiency far more by spreading their fertilizer correctly. Accurate section control also avoids under-application on the headlands; the largest part of the field.

Weigh cell

On-the-move calibration allows lower quality materials to be used, because even

when the density changes the spreader adjusts and still applies the same amount. The real top-end machines have torque-sensing on the disc shafts that detect the amount of fertilizer on the disc and adjusts the position of the fertilizer falling onto the disc to maintain the spread pattern.

Forced feed

Bredal have a very good forced metering system using a small belt to deliver the fertilizer right onto the discs. Great for slightly variable quality fertilizer where the odd lump or damp bag needs some help to get through the machine evenly.

Isobus

Plug-and-go into the tractor controls is a must for section control and allows variable rate application plans to be fed into the machine – something that the very best performers are already doing.

Fill height

Often forgotten, but making a machine easy to fill can save hours when there is a short window to apply the fertiliser and you are re-filling every 20 minutes. High fill spreaders are great with tractor loaders and handlers, but it is amazing how often you see cracks in the frame where operators drop them right onto the ground to get the hopper low enough.

Maximum spread height

An important consideration for topdressing tall crops such as Sunflowers!

Hydraulic drive

Easy to couple up to the tractor with no PTO, and more precise disc speed and spread pattern over hilly terrain.

Soil

About the Author,
David Jones is the former Broad Acre Specialist at Crop Nutrition Laboratory Services Ltd. (CROPNUTS). David has a keen interest in soils and no till farming systems where he has undertaken work looking into weed levels and changes in soil structure, and has extensive experience in field trials and in the development of precision farming techniques. In his spare time he enjoys playing rugby.

Migori Abandons Tobacco For Sorghum

Former don says one can make up to Sh80,000 from an acre.

Migori county farmers have revived abandoned tobacco farmlands for sorghum farming, which enjoys a ready market from brewers.

Land that has been lying fallow in Nyatike and Suna West subcounties has seen a high uptake of sorghum farming.

"Tobacco farming has been faced with frustrations and unpredictable markets after firms collapsed with the few existing ones taking ages to pay farmers," former university of Nairobi lecturer Phillip Mwabe said.

Mwabe has opened up 30 acres to sorghum farming after Cereal Growers Association gave them certified fast growing seeds and trained them on how to maximise profit.

"We found a new cash crop and I harvested close to 1,000 tons of the crop after EABL refurbished their plant in Kisumu. Cost of production of sorghum is better and profits are steadier than tobacco," he said.

He said an acre of land produces between 20 to 30 bags of sorghum depending on the input and takes about three months to mature.
"It is even better than maize, less labour intensive yet with high yields as weeding is done once," Mwabe said.

Mwabe says he seeks to expand the venture to one hundred acres in the next season "after the trial phase

proved successful."

"A farmer can get up to Sh80,000 from an acre since" he explained.

Maurice Mauko, another farmer said they are currently defying harsh weather conditions to grow a crop that has proved it can flourish in areas where tobacco failed. Farmers said they are growing the white sorghum variety used in the production of East Africa Breweries Limited's Senator Keg beer.

"Our main challenge is invasion by birds especially for small scale farmers, we have established igneous ways of coping up," Mauko said.

Farmers have infused plastic bottles filled with pebbles which are hung across the farm on lines which when shaken by the wind makes noises scaring away birds. "We also have solar powered bird scare equipment which are installed with eagles and kites (common predators for smaller birds) sounds, this keeps them off our farms," Mauko said.

John Ouma, another farmer from Nyatike has gone large-scale, using his 16 acres for sorghum farming.

"Sorghum is far much better compared to sugarcane and tobacco. Despite harsh climatic conditions, it takes a short time to mature and has positive returns," he said. County Cereal Growers Association agribusiness co-ordinator Caleb Magambo said Migori, Siaya and Busia counties have registered 3,867 new sorghum farmers. The farmers are putting between two and

"Sorghum is far much better compared to sugarcane and tobacco. Despite harsh climatic conditions, it takes a short time to mature and has positive returns,"

Sorghum

15 acres under sorghum.

"Farmers are willing to plant crops but when they fail to get ready market they lose hope. That's why we are partnering with Kenya Breweries to provide a market," he said.

Magambo noted that CGA projected that the farmers will supply between 6,500 and 8,000 tonnes of threshed grain.

"Farmers were advised to use higher-yielding, faster-maturing Sila varieties, which takes 75 days to mature, and majority have embraced it," he said.

The introduction of the crop as an alternative to poor-performing and low-paying maize has continued to net more farmers in the region.

Those contracted are advised to improve soil fertility with legumes such as soya beans, whose industrial demand offers equally promising returns.

Many of the farmers are, however, yet to realise the potential of 12 to 15 90 kilogram bags per acre.

Experts largely blame this on underdeveloped agribusiness practices such as proper farm preparation and management, use of fertiliser, pests and birds control and post harvest handling.

Bura Farmers Opt For Rice Crop

The government has embarked on an aggressive campaign to meet the growing demand for rice through a campaign dubbed "National Rice Development Strategy (NRDS) that began in 2019 and runs upto 2030.

The strategy aimed to identify rice hubs, improve on varieties in order to increase production and bridge the country's deficit to reduce importation of related products. Kenya's domestic rice sector has not satisfied the increasing demand for rice and this is aggravated by the population growth of the middle class and urbanization with people who are increasingly relying on rice for food.

Dr. Mary Mutembei from State Department of Crops at the Ministry of Agriculture and Head of rice promotion programme says the country needs to move from Production of only 15 percent of what it consumes and stop spending more on importation. "We spent an average of Ksh25 billion to import rice despite tripling our production from 50,000 metric tons to 150,000 metric tons in the last 10 years and this shows there is still a huge gap to fill," she said.

Mutembei said this during a farmer's field day at the Bura Irrigation Scheme where the Kenya Agricultural Livestock Research Organization (KALRO) was promoting new high yielding rice varieties said the whole programme gears towards increasing food security and incomes through sustainable rice production. "More intervention is needed to increase the area under rice production and improve irrigation infrastructure. Currently we have identified 24 counties where rice can be produced comfortably," she said.

Mutembei added that the development of new varieties and new technologies, by KALRO through research had seen farmers embrace and that would not only progress the rice value chain but also satisfy demand.

Dr. Ruth Musila, a plant breeder from KALRO said the gap between rice production and consumption in Kenya is huge with imports representing 89 percent. "The year 2020/2021, the country consumed 730, 000 metric tonnes yet we only produce 80,000 metric tonnes, and importing around 650,000 metric tonnes," she explained.

Musila said that in order to reduce the gap, strategic interventions such as embracing improved high yielding rice varieties practicing good agronomic practices for rice production, mechanization and expansion of irrigation schemes is needed.

She also added that, KALRO together with International Rice Research Institute (IRRI) and other partners, had released high yielding rice varieties to rid of the low yielding seeds that were released over 30 years ago. Farmers have been planting and recycling for long. "We are promoting and popularizing the new varieties to increase adoption by using on farm trials and farmer field days and so far we have released Komboka and 08FAN10. The two are doing very well both in Mwea and also here in Bura irrigation scheme but also being introduced in 24 other locations across the country," Musila said.

Komboka rice in Bura Irrigation Scheme is a success story, she said, noting that when farmers started planting last year in October, the area under the variety was only 700 acres but by last month, December 2021 after the promotion the area had increased by 80 percent to 3640 acres.

Musila further explained that Komboka rice variety, is high yielding, preferred by farmers as it is also tasty compared to

local Basmati rice while the price is also low. Another variety- new 08FAN10 that has been dubbed as "Mkombozi" by farmers is also preferred because of its early maturing within 85 days after transplanting and only taking between 95 and 105 days to maturity. "The Basmati variety that is preferred by only 10 percent of Kenyans is quite costly as it goes for Sh 120 per Kilo, but for the new komboka variety, it is cheaper and sells for Sh 100 per kilo and thus affordable to consumers," she added.

Additionally, Musila said that the new improved crops, will automatically be able to replace the imports, considering the basmati variety would in one acre of land yield around 2.5 tonnes compared to the new improved varieties which yields around 6 to 7 tonnes which is 100 percent more of what local varieties are yielding thus giving farmers higher prices "We want the new varieties to compete with the imports and we are targeting schools and institutions and asking farmers to embrace the high improved varieties to fill in the huge gap between production and consumption," Musila said adding that the seed is available and also at the national cereal board thus it's easy for the country to move towards rice self sufficiency.

John Macharia, a farmer in Bura Irrigation Scheme since 1982 and growing cotton, Maize and then Basmati rice said that since he started planting Komboka rice, he had managed to transform his life completely. "This variety of rice is early maturing and within 76 days I am able to harvest. A farmer introduced it but now we have around 200 farmers growing it within 2500 acres of land," he said.

Macharia said that when it comes to pricing, the Cereal board has been purchasing from them and their payment is prompt. "From the first harvest two years ago, I was able to make some good profit from one and half acre of land that I had planted in Komboka," he said noting that he normally gets between 45 to 50 bags of 100kgs in one and a half acre of land.

Immaculate Wanjira Mboya, another young farmer from Bura Irrigation Scheme said her life and those of her siblings improved after giving a try to the Komboka rice varieties. "Initially, I used to grow maize and cotton which had a myriad of challenges and minimal profit." she said.

Wanjira says that since she planted komboka rice in a three-acre land, she was able to harvest 60 sacks and sold them. In the next harvest she doubled her acreage. "I have realized that rice farming will not let me down and despite us having a challenge with farm inputs especially UREA fertilizer which has doubled, I am planning to double my acreage to 12 in my next planting," she said.

Dr. Robert Musyoki, Director KALRO seeds said that the government has been opening up and expanding irrigation schemes in the country thus it will be prudent to ensure that farmers get the right seeds variety, certified and also available. "Initially farmers used to grow rice and recycle the same rice but now we want to ensure that they have certified seeds that yield more," he added.

Musyoki noted that to ensure there is enough supply especially in Bura, they have contracted farmers as seed growers, and they usually give them high value basic seeds and once they plant, KEPHIS inspects and then they collect, process, package and avail again to the farmers. So far, KALRO Mwea has released a total of 9 improved rice varieties for both upland and lowland agro-ecologies. Other varieties in the pipeline are Orylux 6 and CO3 that are already in National Performance Trials LWD/TZ/053 and LWD/TZ/022 candidates of NPT.

Kenya's urban population is projected to reach 50 percent of the total population by 2050, which means the demand for food will lead to a significant deficit in milled rice.

Currently, the demand for rice per individual per year is 20.6 kgs. In 2020, the country produced 180,000 MT, which is projected to increase by 10 percent to produce 520,000 MT by 2030. Despite this, it is expected that rice import dependency ratio will remain high at 89 percent.

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Once Shunned Crops Change Makueni Farmers' Fortunes

Once referred to as orphaned crops, millet and sorghum are making a comeback, not just as a means for income, but also as the preferred choice to ensure food security. Catherine Mbili is among farmers who have embraced the crops and is now making better earnings than when she cultivated maize.

Catherine Mbili, plants sorghum, millet, and green grams on her two-acre farm in Makueni. Ms Mbili who is also a trainer of farmers on these crops said in one acre of sorghum plantation she is able to harvest between 15 and 20 bags.

This means from one acre alone she earns more than twice her earnings when she had previously put the land under maize."Most farmers in this area used to rely on government relief food, but as time went by and they got the knowledge and training on planting drought-tolerant crops for both food and as a source of income. Now they no longer seat and wait for aid," said Ms Mbili.

Millet

Dicey affair

She is among the beneficiaries of a $3.6 million programme by the government and development agencies that seeks to encourage farmers to adopt drought resistant crops. By going back to crops such as sorghum and millet, the agencies hope to make farmers more resilient amid devastating climate change.

Millet

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Greengrams

on Accelerated Institutional and Food Systems Development on Drought Tolerant Crop, Ganga Rao said they are promoting drought-tolerant crops in Kitui, Makueni and Taita Taveta.

Mr Rao said the project is aimed at strengthening the seed system, leveraging of digital platforms to reach as many farmers as possible through extension advisories, enhancing the market and improving nutrition.

"We are working with the farmer producer organisations and the SMEs to ensure that they have a linkage to the market by use of technology," said Mr Rao.

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Unpredictable weather has made the cultivation of crops that require steady rainfall a dicey affair. But the abandoned crops earn the farmers a steady income while guaranteeing them food supply.

The projects is funded by USAID/ ASFD to a tune of $2.2 million for a three year period and World Bank- AICRRA chipping in $1.56 million to leverage on existing government initiatives, public-private partnerships, capitalise on agri-science innovations and use digital technologies for value chain linkages and market intelligence.

Ms Mbili said they have incorporated the use of technology in the training of farmers where they teach them the use of digital media to apply in their farming enterprises. For the elderly, Ms Mbili said they have included the young people in the trainings so that they can assist their aging parents who are the owners of lands in accessing information on farming and marketing.

International Crops Research Institute for the Semi-Arid (ICRISAT) Value chain manager and principal investigator

Mr Nzioki King'ola, County Executive Committee (CEC) Member for Agriculture in Makueni said the drought-tolerant crops had been abandoned by farmers but now they have started a big campaign targeting all growers to go back to these crops as the effects of climate change take a toll on food production.

"Lack of knowledge, skills and lack of information has been a big impediment but I am personally leading the campaign by mobilising farmers to embrace planting of the drought-tolerant crops," said Mr King'ola.

The CEC said the county has already bought smartphones and are being programmed and will be used by extension officers to collect data as they register farmers.

Sorghum

Green-Light for the Importation of GMO Yellow Maize for Feeds

Following President Uhuru's directive to the Treasury and the Ministry of Agriculture to tame the surging cost of feeds, the agriculture sector, allowed the importation of the yellow GMO maize (with minimal GMO content) to be used by manufacturers of animal feed.

Despite the existing controversy, GMO maize is said to be drought and pest resistant as well as higher yields compared to normal maize.

Though a debate ensued on the safety of GMO crops, the change in the policy is set to be gazetted soon. Currently, the cost of chick mash is retailing at Kshs.4,200 from Kshs 3250, a 70kg gunny bag of dairy meal has shot up from Kshs. 2,500 in August 2021 to Kshs. 3,400 while Layers is selling at Kshs. 3800 from Kshs3100.

According to the Livestock Principal Secretary, Harry Kimtai, the ministry of Agriculture has reviewed the framework on importation of yellow maize by reducing the requirements to 99.1% GMO-free. The previous GMO directive saw millers unable to ship yellow maize into the country citing the unavailability of the commodity that was in line earlier stipulated modifications.

Feed manufacturers were also allowed to import GMO cotton seed cake from any place globally in order to boost the production of animal feed in the country. Cotton seed cake amongst other ingredients, such as the sunflower are the major protein supplements for animals and have been in reduced supply in the regional market. This move comes in handy for feed manufacturers as well as livestock farmers who had felt the effects of the escalating cost of animal feed.

How Russia invasion of Ukraine affects Africa's food supplies

No man qualifies as a statesman who is entirely ignorant of the problems of wheat. The words of the ancient Greek philosopher, Socrates

Wheat

Wheat and other grains are back at the heart of geopolitics following Russia's invasion of Ukraine. Both countries play a major role in the global agricultural market.

There is significant agricultural trade between countries on the continent and Russia and Ukraine. African countries imported agricultural products worth $4 billion from Russia in 2020. About 90 percent of this was wheat, and six percent was sunflower oil.

Major importing countries were Egypt, which accounted for nearly half of the imports, followed by Sudan, Nigeria, Tanzania, Algeria, Kenya and South Africa.

Similarly, Ukraine exported $2.9 billion worth of agricultural products to the African continent in 2020. About 48 percent of this was wheat, 31 percent maize, and the rest included sunflower oil, barley, and soybeans.

Russia and Ukraine are substantial players in the global commodities market. Russia produces about 10 percent of global wheat while Ukraine accounts for four percent. Combined, this is nearly the size of the European Union's total wheat production. Wheat is for domestic consumption as well as export markets.

Together the two countries account for a quarter of global wheat exports. In 2020 Russia accounted for 18 percent, and Ukraine eight percent.

Both countries are also notable players in maize, responsible for a combined maize production of four percent. However, Ukraine and Russia's contribution is even more significant in exports, accounting for 14 percent of global maize exports in 2020.

The two countries are also among the leading producers and exporters of sunflower oil. In 2020, Ukraine's sunflower oil exports accounted for 40 percent of global exports, with Russia accounting for 18 percent of global sunflower oil exports.

Supplies

Russia's military action has caused panic among some analysts. The fear is that intensifying conflict could disrupt trade with significant consequences for global food stability.

This is likely to result in big rises in the price of global grains and oilseed, which have been among the key drivers of global food price increases since 2020. This has been primarily because of dry weather conditions in South America and Indonesia that resulted in poor harvests combined with rising demand in China and India.

Disruption in trade, because of the invasion, in the significant producing region of the Black Sea would add to elevated global agricultural commodity prices – with potential knock-on effects for global food prices. A rise in commodities prices was already evident just days into the conflict.

Africa is a net importer of wheat and sunflower oil. On top of this, there are worries about drought in some regions of the continent.

Disruption to shipments of commodities would add to the general worries of food price inflation.

What to expect

The scale of the potential upswing in the global grains and oilseed prices will depend on the magnitude of disruption and the length of time that trade will be affected.

For now, this can be viewed as an upside risk to global agricultural commodity prices, which are already elevated. In January 2022, the FAO Food Price Index averaged 136 points up by one percent from December 2021 – its highest since April 2011.

Vegetable oils and dairy products mainly underpinned the increases.

In the days ahead of Russia's move, there was a spike in the international prices of a number of commodities. These included maize (21 percent), wheat (35 percent), soybeans (20 percent), and sunflower oil (11 percent) compared to the corresponding period a year ago. This is noteworthy as 2021 prices were already elevated.

From an African agriculture perspective, the impact of the war will be felt in the near term through the global agriculture commodity prices channel.

A rise in prices will be beneficial for farmers. For grain and oilseed farmers, the surge in prices presents an opportunity for financial gains. This will be particularly welcome given higher fertiliser costs which have strained farmers' finances.

The Russia-Ukraine conflict also comes at a time when the drought in South America and rising demand for grains and oilseeds in India and China has put pressure on prices.

But rising commodity prices are bad news for consumers who have already experienced food price rises over the past two years.

Wheat Product

The Russia-Ukraine conflict means that pressure on prices will persist. The two countries are major contributors to global grain supplies. The impact on prices from developments affecting their output cannot be understated.

Some countries on the continent, such as South Africa, benefit from exporting fruit to Russia. In 2020 Russia accounted for seven percent of South Africa's citrus exports in value terms. And it accounted for 12 percent of South Africa's apples and pears exports in the same year – the country's second-largest market.

Russia is the fourth-biggest buyer of Kenyan tea, having taken up produce worth $54 million in the 11 months to November 2021.

But from Africa's perspective, Russia and Ukraine's agricultural imports from the continent are marginal – averaging only $1.6 billion in the past three years. The dominant products are fruits, tobacco, coffee, and beverages in both countries.

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Ripple effects

Every agricultural role-player is keeping an eye on the developments in the Black Sea region. The impact will be felt in other regions, such as the Middle East and Asia, which also import a substantial volume of grains and oilseeds from Ukraine and Russia. They too will be directly affected by the disruption in trade.

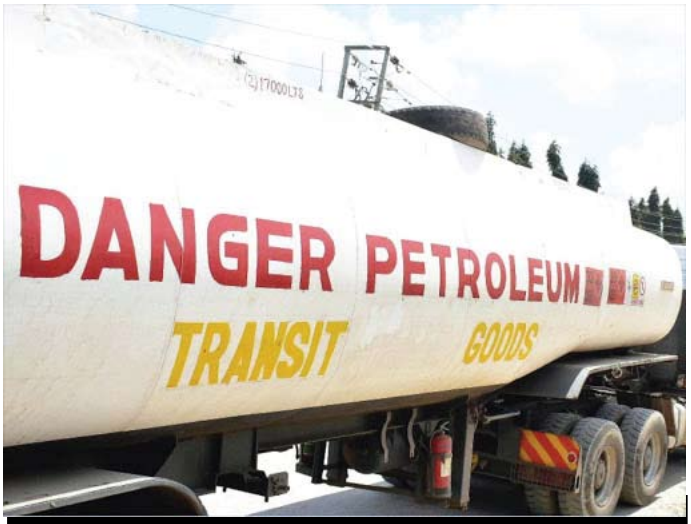
There is still a lot that's not known about the geopolitical challenges that lie ahead. But for African countries, there are reasons to be worried given their dependency on grains imports.

In the near term, countries are likely to see the impact through a surge in prices, rather than an actual shortage of the commodities. Other wheat exporting countries such as Canada, Australia and the US stand to benefit from any potential near term surge in demand.

Ultimately, the goal should be to deescalate the conflict. Russia and Ukraine are deeply embedded in the world's agricultural and food markets. This is not only through supplies but also through agricultural inputs such as oil and fertiliser.

Kenya doesn't have to suffer from the Russia-Ukraine tiff

If the Covid-19 pandemic did not teach us that the world is truly a global village then the Russian invasion of Ukraine will.



The same is being witnessed in the gas sector where the price has almost doubled over the past few months. Russia again is among the largest producers of oil and that affects both the prices of oil and gas.

Kenyans, thousands of miles away are already feeling the heat of the war. The past few weeks alone, we have witnessed a sharp rise in price of cooking oil. Though the situation was already bad due to global inflation, the war has compounded it. The same is being witnessed in the gas sector where the price has almost doubled over the past few months. Russia again is among the largest producers of oil and that affects both the prices of oil and gas.

The war has also revealed that Kenya relies on the global supplies for wheat with Ukraine and Russia being among the largest producers. However, every crisis has an opportunity. Until the covid-19 pandemic occurred, few knew that face masks were imported from China. The cost shot up to around Sh200 per mask. Yet, in a few days of looking inward, we had an oversupply of the same and the prices came down to Sh20 and later even Sh5. Sanitisers were produced in abundance by both small scale and large scale operators. We even had tens of prototypes for ventilators as Kenyans got innovative.

To tame the increase of cooking oil prices, cottage industries can offer some relief. Apart from sunflower, cooking oil can be pressed from avocados, groundnuts, soybeans, canola seed, and sesame seed.

It is unbelievable that Kenyans farmers cannot produce enough of this grain to sustain these industries and supply the all-important oil.

It is also unbelievable that Kenya cannot produce enough wheat. In 2021, a media outlet reported that wheat imports dropped by 89 per cent when the Government reined in and forced millers to mop up local supplies first. According to the Ministry of Agriculture, imports dropped from 2.5 million bags in May to 267,000 bags in June. What this essentially means is that for whatever reasons, importers usually ignore local supplies.

Even if we needed to import, why should we do it from countries thousands of miles away?

Kenyans are not lazy, what usually lets them down are cartels in the distribution chain and that create the impression that they have no market for their produce. Kenya can actually become a leading exporter. Let's only import that which we cannot produce.

Barley Farming is Changing Lives

Barley

To many, just a mention of the word Mau Narok conjures an image of lush green area in Nakuru County that is best known as Kenya's food basket.

The expansive fertile land is considered as Kenya's granary. Countries such as Uganda import carrots from the region.

Apart from carrots, the area is known for potato, cabbage, maize farming besides sheep rearing.

Barley Farming

Unknown to many, the hills of Mau Narok is also a fertile ground of the lucrative barley farming that has changed the lives of many locals.

Beer makers East Africa Breweries Limited (EABL) has entered into contract farming with farmers in the region and this has improved production.

The aged have been growing barley for nearly 50 years. They started growing the crop in early 1970s at a time when maize and wheat were the preferred cash crops.

To grow barley, one must prepare the land well by killing weeds using herbicides followed by ploughing and harrowing.

Fertiliser Ratio

One acre needs some 30-40kg of seeds depending on variety. The recommended fertiliser ratio is 175kg per acre.

Spacing between the rows is 20cm while from one plant to another is 10cm. Top-dressing is done at 50kg per acre depending. Fungicides are applied 35 days after planting, while foliar feed is applied before flowering.

And as the profit margin increased with every harvest, most farmers increased their acreage and demand for the barley by EABL also increased.

"When I reflect on how I started the venture, I have no regrets. My farming has expanded and those farmers who were reluctant to grow barley have joined me," says Mr. Kilesi.

Barley growing has transformed their life, making them lay a strong foundation for their children.

"I have constructed a permanent house and all my children have acquired neccesary education, something I never dreamt of achieving," said one farmer.

He says the credit facility offered by the brewer has enabled him get seeds and fertiliser.

"The loan repayment is stress free as it is deducted from my payment and what is left after deductions is enough to sustain my family," he says.

Hundreds of farmers are now supplying the company with high quality grain for the brewing of beer.

"As a company, our commitment is to source over 80 per cent of raw materials

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from local farmers as one way of improving production and empowering them to eradicate poverty," said East Africa Malting Limited (EAML).

EABL pays barley farmers over Sh1 billion yearly. According to statistics, about 60 per cent of barley processed by the company come from Mau Narok region. The company processes more than 40,000 tonnes of barley from the region.

But what is the secret of rapid production in recent years?

New Varieties: This output can be attributed to the introduction of new grain which have led to the production of higher yields and greater resistance to water logging. The new varieties of barely are a game changer. Since I started planting aliciana variety, my yield has increased to 2,200kg per acre," says one farmer. The grace variety yields about 1,500 kg per acre.

These high yielding varieties are as a result of heavy investment in research by EABL, this has translated into more money into the pockets of farmers and good quality malting material for the company and high quality beer for our consumers. EABL commitment to continue improving its agronomical systems. Their ultimate goal is to create sustainable relationship that is beneficial to all along the value chain.

Seamless Supply: One of the longest barley farmers in the region, Mr David Kilesi who started farming in 1972, said the supply of quality seeds and availability of extension officers

has turned around farming in the region.

"The secret of success is seamless supply of quality seeds, and the extension officers who advise us on best farming practices and the purchase of our produce at good prices by KBL," said Mr Kilesi who is also the chairman of the Barley Gowers Association of Kenya.

While many young people are not interested in farming, in Mau Narok, the farmers have encouraged their children to follow in their footsteps.

"The extension officers have also trained our children on barley farming and are now planting the cash crop," said Mr Kilesi.

The annual farmers' field days have seen about 85 per cent of the farmers in the region to embrace barley farming.

Seed Dressers: Farmers' field days are critical as farmers learn tips on how to cultivate, seed rates, fertiliser usage, recommended insecticides, fungicides, herbicides to be used on barley and seed dressers.

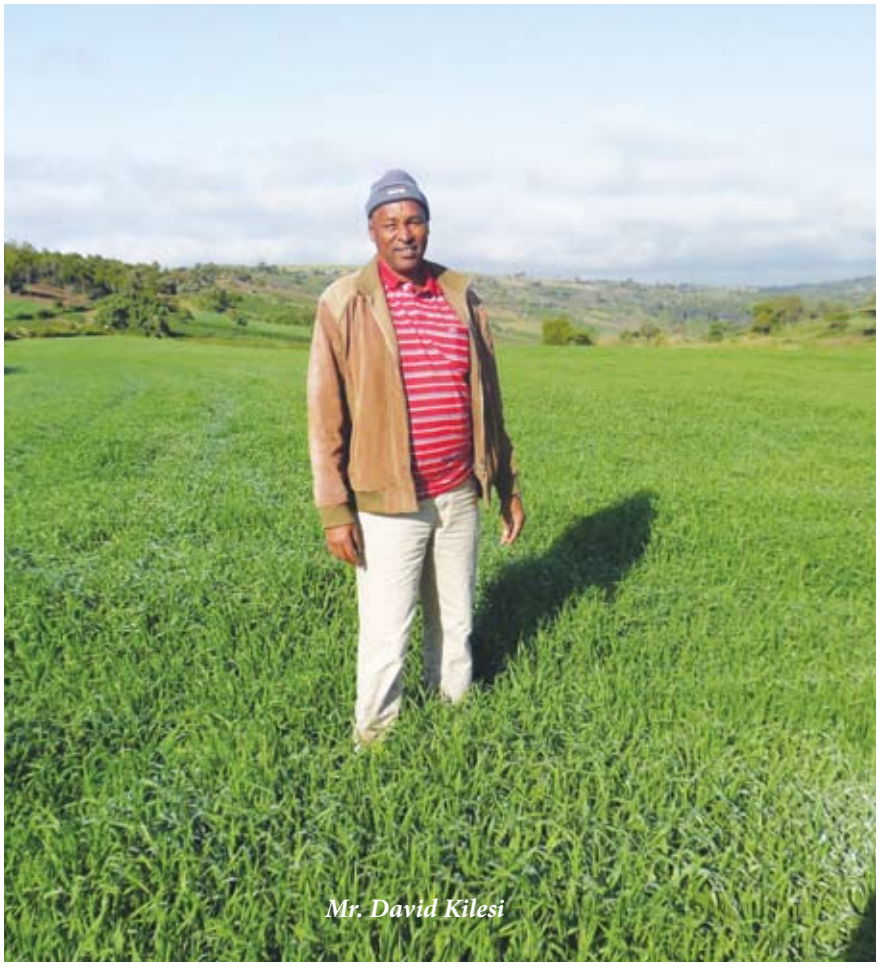
For one to be contracted, the farm, should be at least 15 acres for the purposes of mechanisation. It should also be within the barley growing zone.

Diseases: However, barley farming has had its share of challenges and top on the list being resistance to pesticides, weeds and erratic weather patterns.

Diseases like net blotch, scald, barley yellow dwarf virus and leaf rust are also a problem while pests include Russian wheat aphid.

Switching from barley to wheat is a challenge to brewers

Lodging, which happens when the barley slouches and falls due


Mr. David Kilesi

to excess use of fertiliser or because of heavy rains or winds, presents a challenge to farmers as most of the grain is left uncollected on the ground since the combine harvester cannot pick it.

The switching from barley to wheat is one of the challenges the East Africa Maltings Ltd (EAML), a subsidiary of East African Breweries Limited, which contracts farmers in the major barley growing areas.

"When the wheat prices are good, you find farmers shifting to the crop. The good thing with barley is that you do it on contract so that by the time of planting, one already knows the price, says Mr. Kilesi.

Farmers are contracted at the start of the season based on sales projections for the year. After EABL have known how much will be required to make alcohol.

The search for better returns from wheat has not spared even the big farmer. Purko Development Trust Agricultural Estate, a communally owned land in Tipis, Mau Narok, is one of the big farms contracted by EAML. The group has on average 500 acres of its vast 3,600acre-estate under barley and 700 acres under wheat, while the rest is used for pasture.

The farm gets up to 3 tonnes of barley per acre, but in a bad year of heavy rains and strong wind, yields can halve, the brewer provides them with inputs like seeds, herbicides, fungicides and fertilisers. Due to lodging, earnings in most cases reduce from between Sh45,000 and Sh60,000 per acre to Sh24,000, a reason that makes farmers shift to wheat.

Barley if well-grown is 1.5 times higher than wheat

An agro-economist at Tegemeo Institute, notes that it is important for farmers to look at the economics of barley and wheat production before making decision.

"Barley takes about four months to grow compared to wheat which takes five months. This short growing period reduces the labour time tied to the farmer, more for barley than with wheat."

He adds that the production level for barley if well-grown is 1.5 times higher than wheat, with barley having a potential of 30 bags per acre while wheat can go up to 18-20 bags.

"The higher yields lead to more returns given the lucrative market for barley which is grown under contract farming with the EAML. The firm also provides training and inputs to farmers, which motivates its production. Barley prices are offered by the brewer compared to wheat price, which is market-driven.

"Wheat like maize is prone to fluctuating prices due to importation which dampen their prices in the markets. The production areas of Narok, Njoro, South Rift regions and the North Rift are further prone to lethal necrosis diseases. It, therefore, makes sense to grow barley."

We will Soldier On

The main challenge with barley, is its high cost of insecticides, pesticides, fungicides and the recommended chemicals.

Despite these challenges, many farmers are determined to soldier on continue enjoying the benefits of barley farming.

Run over, Belt Up and Radiate Fall Army Worms.

"I wish I was a newspaper so I could be in your hands all day," Officerless alias Biheshimiwa fumed as she approached the sitting room. Without mincing words or turning my eyes from the obituaries page I was reading, I fired back, "I too wish that you were a newspaper so that I would have a different one every day." This opened a canon of unprintable, which she vomited into my face and left me lying on the sofa set like a deflated condom.

Eureka! Eureka, I shouted only for my wife to aim a WFD (Weapon of Face Destruction) on me. Shut up, what is wrong with you? Why are you pretending to be Archimedes? This could not stop me from my celebration, but thank God, I had won the obituary writing competition hence saved my Job.

It is with profound sadness, deep sorrow and humble acceptance that we announce the untimely death of Fall Army Worm alias *spodoptera frugiperda*, which occurred yesterday at the farm after three consecutive Bombs unleashed from different positions. Doctors attending the patients say they were Run, Belt and Radiated.

The first attack by Runner, experts say is the only bomb alias IGR that killed embryo in egg before it hatched thus strong ovicidal activity. It also offered a long residual control. It controlled the larval stage by interfering with the molting of the Fall army worm larvae and had an effect on fecundity of adults both male and female that were exposed thus excellent population dynamics control.

The manufacturers of the Bomb, Corteva AgriSciences recommended a rate of 0.5L/Ha or 20ml/Knapsack sprayer. The Bomb is best unleashed before eggs are laid and when larvae are foraging.

To avoid resistance another Bomb with a completely different mode of action was unleashed. Belt as it was called was manufactured by Bayer East Africa. This weapon of mass destruction is a novel chemistry with unique mode of action. It wiped out the remnants with its known provision of long lasting efficacy and excellent margins of safety. The missile ensured an immediate cessation of feeding, a broad application window, and high usage flexibility. Farmers were using 10mls/20ltrs knapsack. Those who sprayed early in the morning or late in the evening maximized protection. It is also adviseable to alternate with other insecticifes after two sprays.

This WMD caused rapid paralysis of the larvae, which quickly forced it to stop feeding and moving. It also caused rapid insect death hence providing greater plant protection. The missile had a translaminar activity providing complete leaf protection. Most died in ICU after they developed stomach poisoning and rapid cession of feeding.

The few who remained were never lucky for they were radiated with Radiant 120SC. According to our pathologist this caused a fast knockdown. It impacted a translaminar activity long residual control. It wiped out all larval stages of Caterpillars. Additionally it killed our cousins Thrips who infect maize with MNLD due to it's broad spectrum control. Farmers were advised to use a rate of 150ml/Ha or 10ml/Knapsack sprayer. Best to spray at peak egg hatching stages. The Manufacturers have also advised them to alternate with other IGRs to avoid resistance.

Though nothing can bring back the hour of splendor in the grass, or glory in the flower. We shall grieve not, rather find strength in what remains.

"You are a candidate for a mental institution," my boss said after reading this death announcement "They rigged me out but you can call them now as I have rested my case" I answered in a quick rejoinder.

Immediately, he gave me my new business card, which read, Dr. (Debtor) Officer, BSC, (Bachelor of Stoning Cars), MPC (Mad People's Combination) UON (University of Nowhere) MA (Masters in Anything), PHD (Permanent Head Damage) in Laughtology, Esquire. ETC (End of Thinking Capacity). You can use it in your next mission impossible.

However, don't tell this to Biheshimiwa alias officerless otherwise I will be an IDP.

Immediately I left for my home village, Mukobero. I found my grandmother warming water with his grandchildren collecting cow dug. "Thank God you have come you will help us fight an Insect that is tormenting our maize. It is green, brown or black in colour depending on development stage.

When mature it has a distinct white line between the eyes, which form an inverted "Y" pattern on the face (this is seen when the worm is placed facing you). In addition, there are pronounced four black spots aligned in a square on the top of the 8th segment near the back end of the caterpillar. From first to third instar, the caterpillars are small and their initial infestations on crops often go unnoticed.

The pest is attacking maize at emerged leaves stage resulting to 100% crop loss, its attack on young maize totally reduce plant density, warranting re-planting. Infestation on grain in the cob predisposes such to fungal attack. Destruction of the silk results to reduced pollination and hence grain formation. In addition, attacks on tassels affect pollen provision. We are using hot water and cow dung to control it", she said.

"This is mission impossible *cucu* on a 3000 acre farm, how many litres of hot water do you need. You need a simple spray program of Runner-Belt-Radiant. You can change the program in reference to the stage of the pest. It is also adviseable to scout and detect early. So please do not smear my vacation with cow dung", I summed

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BENEFITS OF TRIPTON TC

- Stimulates germination (Uniform Emergence)
- Positive germination effects (Healthy strong roots)
- Increases maximum coleoptile length
- Improved seedling emergence and stand

The idea is to give a supplement of nutrients and stimulant to maximize germination rate

Tripton TC maximizes germination rate, stimulates root development and seed emergence

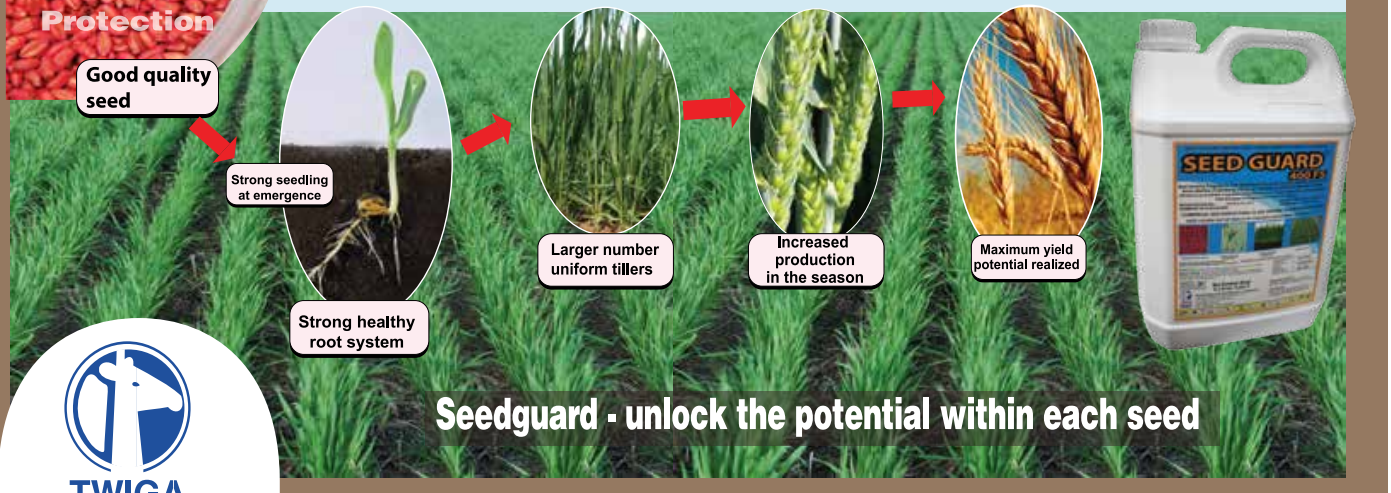
coda

SEEDGUARD 400FS®

(Carboxin 200g/L + Thiram 200g/L)

'Seed is valuable and needs to be protected'
'Mbegu ni muhimu na inahitaji kulindwa'

SEEDGUARD 400FS is an advanced flowable formulation, designed for the farmer's convenience for effective disease control, better crop emergence, enhanced root growth, improved crop vigour and uniform crop.



Seedguard - unlock the potential within each seed

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