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Editorial

AM Panicking.

When I drove to Trans Nzoia and neighbouring counties Early April, I had a bit of a panic, and it wasn't at the thought of you, because you all are an awesome sight. It was about what I had read about Fall Army Worms. "Am I an alarmist?"

And as I pen down this, am still in a panic mood. It is true, Fall Army Worms have invaded all maize growing areas. As usual government officials are doing a document to policy makers to map out a strategy. The farmer is using cow dung and hot water. The extension officer is asking him to report any sight of the worm. The county governments are in a panicky mood. Being an election year, the policy makers are busy criss-crossing the wards, constituencies, counties and the country asking for our votes.

Facts we need to face are: This is not a pest any small scale farmer can manage. It cannot be managed by a single product. Farmers need a spray program of at least three products depending on the starting stage. It is a migratory pest. This calls for knowledge and finance. Only the the National Government has muscle to deal with this invasion.

As I proceed with my editorial, am still in a panicky mood. How I wish I never knew the impact. You have probably heard this saying: "Knowledge is power." But today I want to ask, Is there actually more power in not knowing? I end in a panic. Would I have been if I never knew all this?

Maintain your composure.

Masila Kanyingi
Editor

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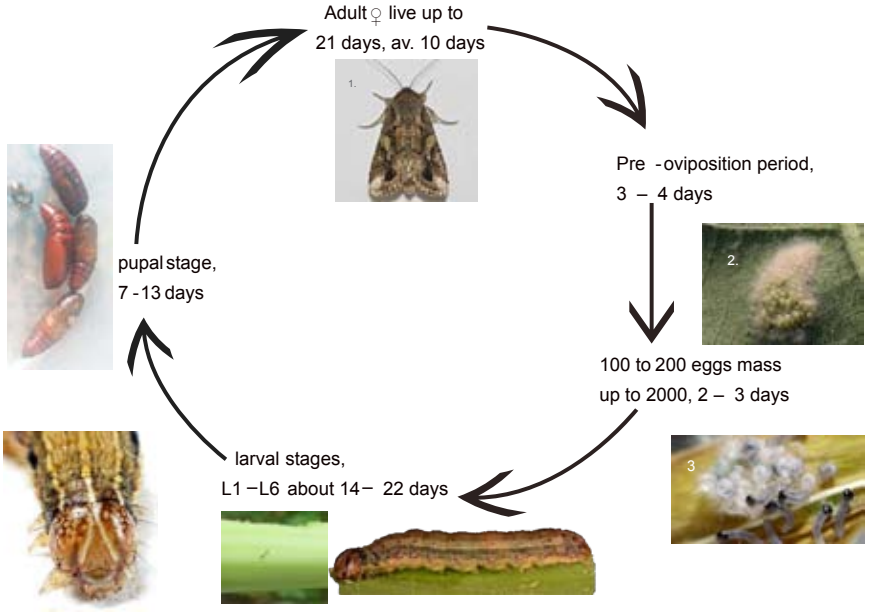
MINISTRY OF AGRICULTURE

Compiled By
State Department of Agriculture

Government Efforts to Manage FALL ARMY WORM *(Spodoptera Frugiperda)*

Fall Armyworm Moth; is a migratory pest native to North and South America. This pest occurs in large numbers and its caterpillars cause severe damage to more than 80 plant species especially cereal crops such as: maize and rice.

Life cycle, 24 -40 days



The Ministry of Agriculture, Livestock and Fisheries constituted a multi-institutional technical team with experts drawn from public and private sector. The institutions represented include: KALRO, KEPHIS, CABI, PCPB, ICIPE and Plant Protection Services; State Department of Agriculture. The team developed a strategy to guide efforts towards management of Fall Amy worm.

Status of Fall Army Worm Spread in Africa

From the African continent, this pest was first reported in September 2016 in the West Africa region. It has now been reported in Central, Southern and East African regions. In Kenya, FAW infestation was first detected in Trans Nzoia County in the second week of March, 2017 on off-season irrigated maize.

Spread and Likely Economic Impact of FAW in Kenya

A field survey conducted in March 2017 and other current reports have confirmed presence of fall army worm in the following counties: Trans Nzoia, Bungoma, Kakamega, Uasin Gishu, Nandi, Kericho, Baringo. The pest has quarantine status in Europe and its presence therefore has implications on international trade. This is critical due to the wide host range.

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Fall Army Worm Identified in Bungoma

Bungoma County has issued an alert to farmers over the detection of the "Fall Army worms" in the area.

County Director of Agriculture Fredrick Wotia said that the destructive pest has been identified in all the nine sub counties. He asked farmers to apply recommended chemicals to counter the worms, combat an outbreak and prevent further spread.

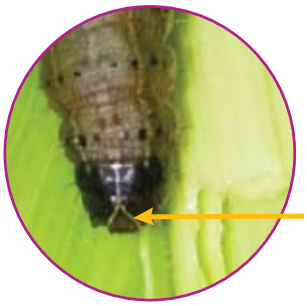
He said that the department has deployed at least two agricultural extension officers per ward to monitor the situation on a daily basis and provide farmers with the relevant information on how to deal with a projected outbreak. His department, he said was also sending bulk sms to social media groups to make sure the information is received widely.

Wotia claimed that the worms can cause 100 per cent crop destruction if unchecked and added that measures had been put in place to guard the spread.

He called on farmers in all the nine sub counties to be on the alert and work closely with local agricultural officers. He said due to the migratory nature, the pest could not be contained in a specific area hence the need for farmers to make use of the chemicals now available..

Fall Army Worm Total Control

Broad, pale band along top of body, contrasted by dark striping at the sides



Head with dark net-like pattern and upside-down, white **"Y"** marking

Eighth abdominal segment with four dark spots

Syngenta solution for Fall Army Worm

Voliam Targo®
500ml/Ha

or

Match®
600ml/Ha

VoliamTargo® and Match® should be alternated for best results

The best time to spray is early morning, late afternoon or at night. Start spraying as soon as the pest is spotted when small windows appear on the crop.

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Comparison with other Caterpillars

Infestation by stalk borer is different from FAW damage. The stalk borer caterpillar bores into the stalk. The FAW caterpillar feed more on peripheral foliage, making larger more ragged holes. They also tend to burrow through the husk instead of feeding down through the silks

How Faw Spread

Long distance introduction of FAW is mainly through great flying capacity of adult moths. In addition, the large number of eggs laid enables the pest to quickly establish in a new area. Movement of infested plant materials; (green or dry stover for animals, green maize cobs) can aid in carrying the different FAW stages within the same farm or in the locality. In Kenya, long distance movement of green maize for roasting is a thriving business, which can contribute to the spread of the pest.

Implication of Fall Army Worm Infestation

This pest causes severe damage to plants such as maize, rice, pasture, sorghum, pear millet, cotton and some vegetable crops. This results into economic loss which impacts negatively on national food security and income. So far in Kenya the pest has been noted only on maize. Attack on maize at vegetative stage can result to 100% crop loss if no control is taken. Attack on young maize can 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, attack on tassels affect pollen provision.

This pest is spreading rapidly and has potential to cause 100% loss in a wide range of crops such as: maize, rice, pasture, sorghum, millet, cotton and some vegetable crops. This will result into national food insecurity and loss of income unless urgent measures are implemented.

How to Identify FAW

The fall armyworm caterpillars are green, brown or black in color depending on development stage. A mature caterpillar 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

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Armyworm outbreak wreaks havoc in Western Kenya Farms

The fall armyworm is destroying maize plants in parts of Western Kenya and the Rift Valley. Leaders from Western Kenya want the fall armyworm invasion in the region declared a national disaster. Trans Nzoia Governor Patrick Khaemba and Kakamega Deputy Governor Philip Kutima said the pest had invaded huge tracts of land under maize and would lead to huge losses.

Speaking in his office, Prof Kutima said the Sh50 million emergency kitty per county was a mere drop in the ocean. "It is too little to help us mount a serious campaign that would help salvage our crops," he said. Governor Khaemba said farmers were losing everything following the invasion by the worms.

"The national government must declare this tragedy a national disaster and allocate enough money to deal with the problem without further delay. We may have 100 per cent loss of the crop," he said. The pest, which fast attacked farms in Kakamega County has been spreading like wild fire to neighbouring counties including Bungoma, Trans Nzoia, Busia and Vihiga.

Mr. Peter Lunani, a large scale farmer in Trans Nzoia, is counting losses already after the worms invaded his 300 acre farm and destroyed maize. Lunani, who engages in both seed maize and commercial maize production in Saboti has lost investment worth Sh1 million to the worms. "I had spent about Sh30,000 per acre. All this has gone to waste. My efforts to spray the farm to fight off the pest have been unsuccessful," the farmer said.

Mr. Lunani is not alone and did at pains to explain the pest, which was first spotted in the county last December, cause the massive destruction. He is fearful that due to the pest attack on maize seeds, there might be a possibility of shortage next year. "We don't know how we are going to service the loans we took to undertake the activities. We are urging for support from the national government to provide us with free farm inputs for replanting," he said.

A pesticide recommended to fight off the worm, is unaffordable to most farmers. One litre to spray 10 acres sells at Sh22,000. According to experts, the chemical is supposed to be sprayed within an interval of 14 days until the crop matures.

In Kiminini and Endebess sub-counties where several farmers had done dry planting, the crop has been consumed by the pest and they have no option other than replanting. "It is a big loss. We have to look for money and replant because the entire crop field has been ruined," complained Philip Sakong, a farmer in Matumbei ward.

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are small and their initial infestations on crops often go unnoticed.

FAW Host Range

This pest mainly attacks cereals: (maize, sorghum, rice, millet, wheat, barley), fodder grasses: (Bermuda grass, Hay grass, and Napier grass), sugar cane and cotton. Others susceptible crop includes: kales, cabbages, legumes/pulses, banana, tomatoes, capsicum, ginger, spinach, amaranths, onions, sugar beet, citrus, cucumber and sunflower. It can attack over 80 different plants.

FAW Life Cycle

This pest undergoes complete metamorphosis: eggs- larva- pupa- adult.

Eggs: The female lays 'egg masses' on the host plant - about 150-200 tiny eggs which are covered with protein sheath to protect from attack by natural enemies and pesticides. In her lifetime, a female lays 1,500-2,000 eggs. Eggs hatch in 2 to7 days depending on weather conditions.

Larva: The larval stage is the destructive phase feeding on plant soft tissues. Before pupating, caterpillars go through 6 instars with their color changing from light green to dark brown. The upper side of the body retains a light color above longitudinal stripes. FAW caterpillars take 2-3 weeks to mature, are 3-4 cm long, and have 8 prolegs with additional pair on last abdominal segment.

Pupa: The pupa is shiny brown and found underground (2.5 cm -3.7 cm deep) from which an adult emerges in 1-5 weeks depending on soil temperature.

Adult Moth: are active at night and mates in the evening. The females (1.7mm x 3.8mm) are slightly bigger than the males (1.6mm x3.7mm) in wingspan. The male forewing is mottled; (light brown, grey, straw) while

Damage Caused by FAW

The caterpillars feed and damage leaves and inside whorls of young maize plants resulting in small shot holes or large ragged and elongated holes on the plant. Severe feeding gives the appearance of maize that has been damaged by hail. After feeding, FAW caterpillars leave behind large amounts of moist sawdust-like frass near the whorl and

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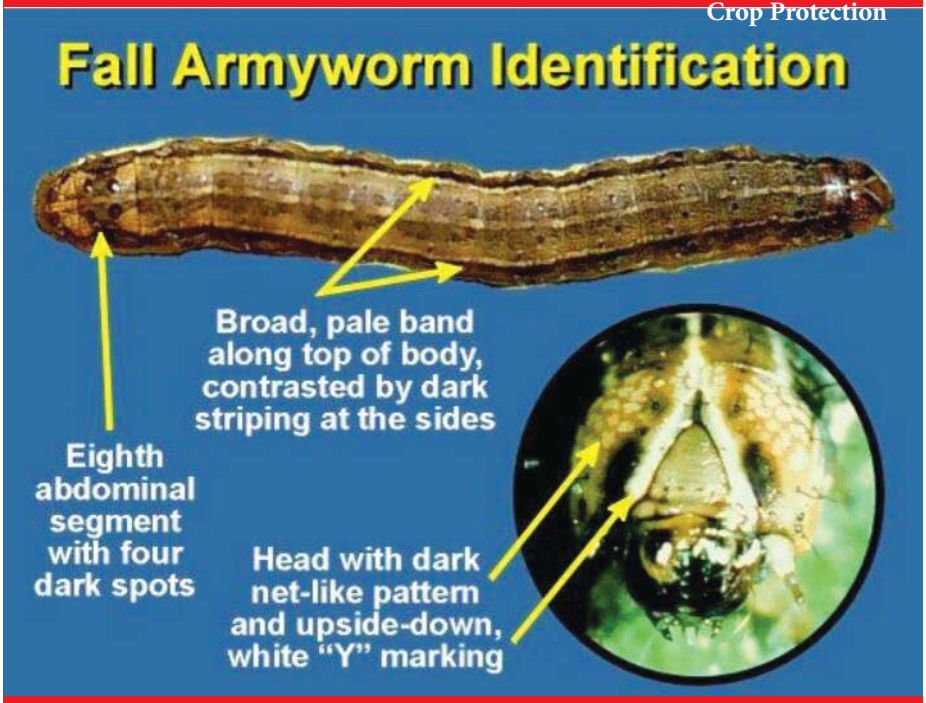

Dow AgroSciencies Discusses Fall Army Worm Solutions

"Growers in maize growing areas looking for a long-lasting solution to Fall Army Worms can count on Dow Agrosciencies for effective control. Speaking exclusively to Cereal Magazine, Mr. Oscar Shiebo, Business Development Manager East Africa said, "Assuming you start at early stage of pest infestation and crop farmers can easily manage it".

" In managing it, the main issue is controlling the right stage of the pest with the suitable product. Farmers must ensure resistance management is taken into consideration, by alternating products of different chemical groups and mode of action", he said. Mr. Shiebo advised farmers to go for short interval of sprays and good coverage at early stage of crop crucial. Adding, You need to be careful to avoid recommendation of products that are known to have developed tolerance / resistance against the pest from where it is coming from".

To manage the pest, Mr Shiebo presented two of their main solutions which farmers can use to manage it.

Radiant 120SC.

Key Product Features:-

- Fast knockdown and broad spectrum control
- Has translaminar activity
- Has long residual control
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- Controls also vectors of MNLD in Maize i.e. Thrips.

Use rate. 200ml/Ha or 20ml/Knapsack sprayer. Best to spray at peak egg hatching stages.

Runner 240SC.

Key Product Features:-

- Only IGR that kills embryo in egg before it hatches thus strong ovicidal activity.
- Offers long residual control.
- Controls the larval stage by interfering with the molting of the Fall army worm larvae,
- Can be alternated with other IGR's as is in a different chemical group than others.
- Has effect on fecundity of adults both male and female that are exposed to spray thusexcellent population dynamics control.

Use rate is 500 mls per Ha or 50ml/Knapsack sprayer. Best to spray before eggs are laid and when larvae are foraging.

However, he advised growers to alternate the two products with other IGRs with different modes of action to avoid resistance. A few of the products farmers can alternate with are Belt, Voliam Targo Coragen etc.

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Trans Nzoia County Sets Aside Sh 45 Million to Fight Fall Army Worm

The county government of Trans Nzoia has set aside Sh 45 million towards the fight of the Fall Army worm pest which risks wiping out more than 500 hectares of maize plantation in the country's bread basket. This follows a warning by the Kenya Seed Company that Maize farmers in counties bordering Uganda and Tanzania may be worst hit by the pest if relevant county governments fail to act in time. Governor Khaemba also said the funds will be committed to field extension services where farmers will be sensitized on how to identify the pest, if their crops are infested, for quicker action.

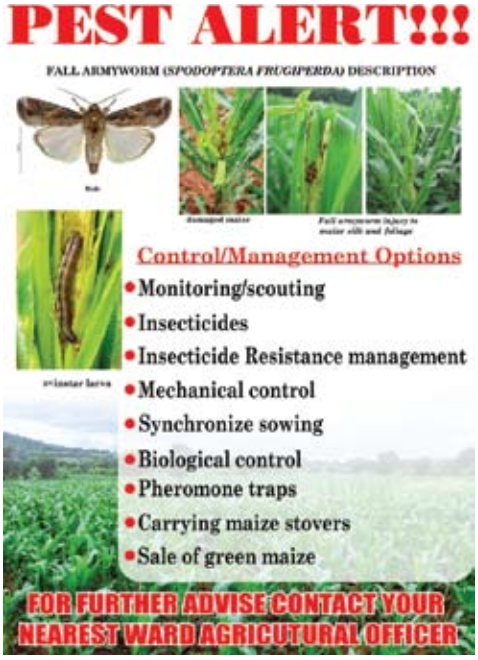
upper leaves. FAW infestation cause stunting and destruction of developing tassel and kernels, thereby reducing grain quality and yield.

Management of FAW

No studies in the country have been undertaken, therefore, the suggested management options are based on publications from other countries. Strengthening national and county capacity in surveillance, diagnostic skills and management of fall army worm by training public-private extension service providers, seed inspectors, agrochemical dealers, spraying teams, researchers, farmers and the general public is critical to fast track adoption of the following strategies to mitigate against the threat of this new migratory pest:

1. Early Warning

For detection and early warning mount at least one FAW specific pheromone trap per Ha.



2. Monitoring/Scouting

Scouting for signs and symptoms of the pest should start one week after crop germination.

3. Mechanical Control

1. Deep ploughing exposes the pupae to predators and solar heat.

2. Planting varieties with hard husk cover provides a barrier.

3. Use hands to squash the caterpillars. Remember killing one caterpillar prevents more than 1500 - 2000 new caterpillars after a period of less than 4 weeks.

4. Collect and drop caterpillars in hot water to drown them.

4. Cultural Methods

a) Farmers should plant early and adhere to regional planting calendar and avoid late and off-season planting.

b) Farmers should avoid planting new crop near infested plants .

c) Farmers should use recommended fertilizers and keep fields weed free to boost plant vigor.

5. Mass Trapping

Set up 4-6 FAW Pheromone traps per Ha to suppress the moth population

6. Chemical Control

a) The potential effective insecticides against this pest include: Diazinon, Alpha Cypermethrin, Chlorpyrfos, Diflubenzuron Triclorfon (Dipterex), Chlorantraniliprole, Spinetoram, Emamectin benzoate, Indoxacarba and Lambda Cyhalothrin.

b) For effective control in maize, spray at least three times starting two weeks after emergence, at knee high and just before tasseling.

c) However these products need to be used appropriately at right environmental conditions to minimize development of pest resistance.

d) All farmers in a given locality should spray to avoid neglected farms, which become breeding grounds for the insect and a source of re-infestation.

7. Restrict Movement of Infested Plant Materials

The public is discouraged from moving infested plant materials to areas where the pest has not been reported.

Kakamega acquires Sh3million chemicals to contain dreaded Fall Army worm

Kakamega County is racing against time to control the spread of the dreaded fall army worms.

Experts had earlier warned that the pest could spread across the entire region if quick action is not taken. Kakamega County has since set aside Sh3 million for purchase of chemicals to help control the the pest's spread.

The county's agriculture boss Kulati Wangia said "We are staring at a disaster because the pest is fast spreading to Trans Nzoia, which is the country's food basket. So far, there are deliberations among the four counties in former WesternProvince namely Vihiga, Bungoma, Busia, Kakamega and Trans Nzoia on how we can pool resources to rid ourselves of the armyworm menace," he said yesterday.

Kulati said they would target the most affected areas first because some farmers might not afford the chemicals that have been tested and found to be effective against the worms. Masimba said the pest could resort to attacking sorghum, rice, Napier grass and even ordinary grass after wiping out all maize farms. "That is why we are calling upon farmers to attend our public barazas to learn more and know the exact chemicals to use."

Farmers have been advised to pool resources and buy the required chemicals as opposed to resorting to traditional methods such as smearing cow dung on affected crops.

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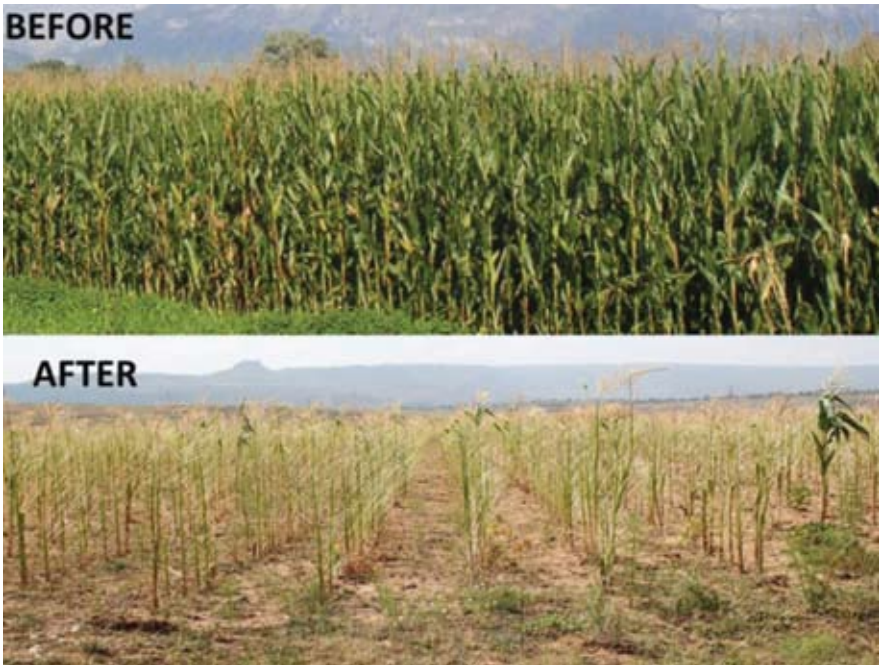
By Kenneth Wilson
Professor at the Lancaster Environment Centre, Lancaster University

Armyworms are wreaking havoc in Africa. Why it's a big deal

A combination of native African armyworms and Fall armyworms from the Americas are ravaging staple crops across Africa. If uncontrolled, they have the potential to cause major food shortages. The Conversation Africa's energy and environment editor Ozayr Patel asked Kenneth Wilson to explain the threat and what can be done about it.



What are armyworms, where do they come from and how do they travel?

Armyworms are the caterpillar stage of moths belonging mainly to the genus Spodoptera. They are called armyworms because when they have ravaged a crop they march along the ground like a vast army of worms in search of more food.

This sequence of outbreaks began in late 2016 and has spread rapidly ever since. Because armyworms feed on many of the staple food crops they have the potential to create food shortages in the region. The recent outbreaks appear to be a combination of the native African armyworm (Spodoptera exempta) and a new invasive species called the Fall armyworm (Spodoptera frugiperda). This new species is endemic to tropical and subtropical regions of Central and South America, where it causes considerable damage to maize and other crops.

The Fall armyworm was first formally identified as being on the continent as recently as January 2016 in West Africa, including Nigeria and its neighbours.

It is unclear how it reached Africa from the Americas but it's likely it arrived on imported plants. It's also possible that it migrated across the Atlantic on favourable winds over multiple generations.

It is not yet known whether the recent outbreaks are derived from the earlier West African ones. But Fall armyworms are known to be strong migrants in the Americas. Every year Fall armyworms fly from Mexico and the southern states of the US to Canada.

What makes them so devastating?

Both African and Fall armyworms do most damage to the staple cereal crops such as maize, wheat, sorghum, millet and rice. They also eat pasture grasses which has an impact on livestock production.

The African armyworm – they can be 3cm long – can reach densities as intense as 1000 caterpillars per square metre, quickly razing crops to the ground. On maize, the number of caterpillars per plant is, of course, much lower but it can cause just as much of an impact. The insects strip the leaves of even mature maize plants bare.

Unlike their African cousins, the Fall armyworm also feeds on a range of non-cereal crops. Nearly 100 different host plant species have been recorded. These include cotton, soybeans, groundnut, peanut, potato, sweet potato, spinach, tomato, sweet peppers, cabbage and tobacco.

Damage to maize is likely to have the biggest impact on farmers in southern Africa because it's the main staple food crop in the region.
The impact of the Fall armyworm is likely to be

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- **Offers long residual control**
- **Controls the Larval stage by interferring with the molting of the Fall Army Worm Larvae**
- **Can be alternated with other IGR's as is in a different chemical group than others.**
- **Has effect on fecundity of adults both male and female that are exposed to spray thus excellent population dynamics control**

Don't let Fall Army Worms run over you, Let Runner run over them!

Dow AgroSciences

devastating because it eats the leaves of the plant as well as its reproductive parts. This damages or destroys the maize cob itself.

Where have the most devastating attacks occurred? What was the result?

In 2012-2013 the African armyworm cut Zambia's maize production by 11%. The latest outbreaks could lead to losses of up to 40% as an estimated 124,000 hectares of maize has been attacked.

In neighbouring Zimbabwe, seven out of eight maize-producing provinces have had armyworm outbreaks, and in Malawi at least 9,000 hectares have been attacked. Figures are not yet available for the other African countries currently affected.

What are the potential economic consequences if the problem is not arrested?

It is too early to say what the impact will be on food production in the region. Chemical pesticides have been mobilised in most countries, though their efficacy has been questioned. In Brazil, where armyworms can breed all year round, controlling them costs an estimated US$600 million a year. The cost of control in Africa hasn't been determined yet.

But it's likely to be substantial given that many litres of imported chemicals have already been bought by countries desperate to protect their crops. This means that even if control proves to be effective it will have been costly.

The economic consequences could be severe if the Fall armyworm persists and spreads throughout Africa region.

What is the best way to stop them damaging crops?

Chemical pesticides can be effective against both armyworm species. But resistance to many chemicals is an issue for the Fall armyworm throughout its native range. It's not known whether there is pesticide resistance in the Fall armyworms blighting southern Africa.

The variable efficacy may be due to genetic resistance, or it might be as a result of the way in which the spray is applied. The Fall armyworms are often inaccessible to insecticides because of their tendency to hide in the whorls and reproductive parts of the host plant.

Research is needed to work out which chemical is the best to control the strain of Fall armyworm in Africa. But there are alternative approaches.

In parts of their native range in the Americas, genetically-modified Bt maize is grown to combat the Fall armyworm. This may also be an option for Africa and some other countries where GM crops are already grown. But many parts of Africa do not allow or welcome GM varieties. And Fall armyworm has also evolved resistance to some Bt toxins, with some evidence for cross resistance.

There are non-chemical, biological pesticides that could also be effective. These are pesticides derived from natural diseases of insects, such as viruses, fungi and bacteria. I have been involved in the development of a highly effective biopesticide against African armyworm in Tanzania. But this still needs to go through the commercialisation and registration process, which is both costly and time consuming.

A similar biopesticide has also been developed against the Fall armyworm, but again this is not yet registered for use in Africa.

Biopesticides tend to be effective against a much narrower range of species than chemicals, which is good for the environment. But it means that they can only be used for a limited number of pests, often making them more expensive than chemicals.

There are also some other indigenous approaches that could be effective. This includes the use of local plant extracts like Tephrosia vogelli and neem, to produce botanical pesticides, and the addition of sand to maize whorls where armyworms are feeding.

Only time will tell what the full impact of this armyworm invasion will have.

Courtesy of:
The Conversation Africa's Energy and Environment

South African Experience:

Managing the Fall Army Worm (Faw) Outbreak.

The fall army worm is a devastating pest that demands all farmer's attention!! Vigilance early detection is crucial!!

Species invasion

The Fall Army Worm Spodopterafrugiperda invaded South Africa and established itself mainly in maize but also in sorghum, cotton, potatoes, some vegetables, onions, probably in groundnuts and in natural veld around maize fields. There is a possibility that this pest may also invade sugarcane and other crops.

Management

Scouting, detection and pest identification

- If pheromone traps are available, they can be placed according to the manufacturers' specifications to monitor moth flights and early moth arrivals. See pictures of moths for easy identification. Moths are grey or brown with irregular markings. Moths can be seen at night in crop fields.

- Early detection is crucial; monitor by scouting crops every 2 days starting from the current wind direction, checking borders and centres of crop fields. Note all egg parcels, new hatchlings or young larvae penetrating the whorls. See attached pictures for easy identification. Egg parcels are covered by a woolly cover. The larvae are quite easy to identify: looking at the larva from its head gives the appearance of a dragon fly face with the markings on the head. Four dark spots in a square are also clearly visible on the 8thsegment. Their colour varies from green to dark green, pinkish, brown or dark brown with paler green longitudinal stripes.

Do not confuse this species with the african army worm or the false army worm. Check the head and 8th segment for the diagnostic characteristics!

Control

- Spray insecticides as soon as the pest is noticed or if 5 – 10% of plants show infestation, e.g. 5 or 10 plants per 100 plants inspected. Use those active ingredients that have already been approved for the fall army worm.

- Insecticides must be applied during the early development stages of larvae. Adult larvae may prove to be very difficult, if not impossible to control.

- The best control is obtained when larvae feed on exposed leaf surfaces where insecticides can reach them outside cobs, ears and tassels.

- As soon as larvae penetrate too deep into the whorl or feed inside the cob nothing will effectively control them. Small larvae are easier to control than that fully-grown larva that can reach up to 40 mm in length.

- Farmers are urged to refrain from using any concoctions or unregistered mixtures and to adhere to the label specifications and dosage rates of the registered products.

- Select the appropriate insecticide, apply according to label recommendations and dosage rates.

- Control varies from very poor to adequate when carbamates and organophosphates are used; it is advisable to test any carbamates and organophosphates on a small patch for efficacy before using it on a large scale.

- Certain strains of Bacillus thuringiensis may not be effective against fall army worm; as with the carbamates and organophosphates it is advisable to first test the product on a small patch before deploying it on a large scale.

- Calibrate sprayer and maintain nozzles and equipment, make sure it is in good working condition, delivering the expected droplet size and spray volume.

- Aim nozzles at plant rows and not between rows to ensure that the target is reached with the maximum spray volume.

- Use optimal spray volumes and best management technique; on average between 200 – 400 l/ha for maize crops should be adequate to deposit active ingredients on the target. Always refer to labels for instructions.

- Adjust water pH and add adjuvants if necessary in accordance with label recommendations.

Do not apply pyrethroids on their own as this species appears to be totally resistant to pyrethroids!!!

Resistance management

- Rotate pesticides groups with different modes of action (MoA) as indicated on the front panel of each pesticide label; simply rotating between active ingredients of the same MoA is not conducive to resistance management.

- Avoid treating consecutive generations of the fall army worm with pesticides with the same MoA.

- All diamide pesticides (chlorantraniliprole and flubendiamide) must be used with very careful consideration of resistance management: consult labels for application cycles and maximum number of applications per season.

List of Active ingredient(s) that could be used for the control of FAW and pheromones used for monitoring.

Active ingredient(s)

Indoxacarb	Chlorantraniliprole
Emamectin benzoate.	Flubendiamide
Methomyl	Lufenuron
Diflubenzuron	Spinetoram
Chlorpyrifos	Profenofos
Mercaptothion	Novaluron/Indoxacarb
Carbosulfan	Beauveria bassiana
FAW Pheromones	Benfuracarb/Fenvalerate
Chlorpyrifos/cypermethrin	
Emamectin benzoate/lufenuron	
Chlorantraniliprole/Lambda-cyhalothrin,	
Bacillus thuringiensis var. kurstakii	
Bacillus thuringiensis var. aizawai	
Spinetoram/Methoxyfenozide	
Pyridalyldichloropropene derivative	

Insect Management in Cereals.

Once fields are properly scouted, data can be used to determine insect control options. Course of action should be started only when you are fully armed with up-to-date, accurate information writes ***Thomas Kipkorir***

Proper crop rotation with alternate crops is an essential practice in any crop production to reduce buildup of insects, weeds and diseases. Insect attacks do not always result in economic injury, so certain insect management practices can be used to ensure cost-effective control decisions.

Scouting for insects.

Depending on location and when the crop is planted, insect problems vary from non-existent to severe. Identifying the pest and understanding its potential for damage is necessary when selecting appropriate control methods. Each pest does not respond the same way to a given method. Monitor fields at least twice per week. Walk a "V" or "W" pattern through the field and select plants from 12 random locations along the pattern. When plants are still small (up to 10 leaves), examine 6 adjacent plants per location for insects and disease. As plants get larger sample 3 leaves per plant on 6 adjacent plants per location (total of 216 leaves).

Insects cause injury to the leaves, stems, roots, and fruit. The developmental stage of the plant at the time of attack often governs which plant part different insect pests may injure. However, some insects feed specifically on one plant structure; others may feed on several structures. The first step in control is to identify the insect.

Certain cultural practices may have a dramatic effect on the potential for economic injury by certain insects. Planting during optimal growing conditions ensures rapid seedling emergence and subsequent growth. This reduces the amount of time that plants are susceptible to injury from seedling insect pests. Most insect problems can be treated as needed if detected early, but no one insecticide will adequately control all the insects that may attack a crop. Scouting for insects is the most efficient way to determine what problems may exist and what action should be taken.

Preventive treatments may be necessary for certain insect pests. Preventive treatments are used against insects that are certain to cause economic injury if they are present. Field history, harvest dates and insect pressure in nearby production areas influence preventive measures decisions.

In addition to monitoring for pest insects, some beneficial species exist which should be considered. Several species of predatory and parasitic insects are present in crops. These natural controls are considered especially during early season. Big – eyed bugs, minute pirate bugs, fire ants and Cotesia wasps are four important beneficial insects. The presence of these natural controls may delay the need to treat for bollworms. The use of beneficial insects should be maximized in attempts to reduce production costs.

Decision to apply an insecticide should be based on scouting and the use of threshold. Scheduled or automatic applications of insecticides should be avoided because unnecessary application can be more costly than just the cost of the insecticide. Application of insecticides on an as-needed basis will allow beneficial insects to be preserved which reduces the likelihood of secondary pest out breaks.

Resistance Management.

In a population of resistant insects, insecticide resistance levels to a particular class of insecticide increase each time that class of insecticide is used. Once a material is used, its level of effectiveness will likely be reduced against subsequent generations within the season.

Therefore, alternating the use of insecticide classes on different generations of insects during the season is a highly recommended resistance management tactic. Since most insect pests are highly mobile, such a strategy will be most effective if adopted by all farmers in a large geographic area.

Pesticide precautions.

• Observe all directions, restrictions and precautions on pesticide labels. It is dangerous, wasteful and illegal to do otherwise.

• Store all pesticides in original containers with labels intact and behind locked doors. Keep pesticides out of reach of children.

• Use pesticides at correct label dosage and intervals to avoid illegal residues or injury to plants and animals.

• Apply pesticides carefully to avoid drift or contamination of non – target areas.

• Surplus pesticides and containers should be disposed of in accordance with label instructions so contamination of water and other hazards will not result.

• Follow directions on the pesticide label regarding restrictions as required by Laws and Regulations.

• Always dispose pesticide containers by burning and burying and not throwing away in water bodies or garbage dumps.

Scouting for insect pest is important for two reasons. Yearly scouting helps you build an on-farm database that can be used to select appropriate insect management tactics for future crops. Scouting also helps you determine if and when to spray insecticides. Once fields are properly scouted, data can be used to determine insect control options. Course of action should be started only when you are fully armed with up to date, accurate information.

Thomas Kipkorir Is The Country Manager, Crop Protection And Health Business At Basf.

Welcome to Kenya's Food Basket

Agricultural sector is the major source of employment for over 80% of the rural population directly while a sizeable number of the county residents are employed in the few small-scale agro-processing industries. The main crops produced in the county are maize, beans, wheat, tea and potatoes. Other crops include coffee and horticultural crops. The total acreage under food crops is 143,807.5 hectares while that under cash crops is 1477.12 hectares. The average farm sizes ranges from 0.60705 hectares for small scale farming to 80.94 hectares for large-scale farming.

Development Constraints / challenges

The key issues underpinning the development of the sector include;

- Declining land productivity,
- Little or no value addition,
- Low producer prices,
- Inadequate extension services,
- Low absorption of modern farming technologies
- Inadequate storage and processing facilities,
- Inadequate markets and marketing infrastructure.
- Expensive agricultural credit,
- Erratic and unpredictable weather conditions,
- High cost of production
- Weak Institutional, Policy and Legal framework for the sector's development.

Objectives

Trans Nzoia county is promoting competitive agriculture and innovative research and growth of a viable sector.

To deliver on this mission the county will strive to achieve the following objectives:

- To improve land productivity and land use.
- To improve agricultural value chains
- To improve agribusiness support and market access thus making agriculture a business.
- To promote crop diversification

Sector Strategies

In agriculture the county is implementing the following key strategies;

- Strengthen extension services and farmer training;
- Promotion of access to subsidised fertiliser, certified seeds and affordable farm inputs
- Reduce post harvest losses through provision of grain storage facilities and post harvest management and promote value chains.
- Strengthen the cooperatives to improve farmer's bargaining power; and improve access to markets
- Enhance diversification in crop.
- Improve surveillance, management and control of diseases and pests.
- Adopt modern technologies and innovation in crop production

Key Interventions in the Sector are:

- Fertilizer cost-reduction investment,
- Maize Milling Plant in Kitale town,
- Crop diversification programme - with Tissue culture Banana,
- Maize driers and grain storage facilities will be installed.

By the end of plan period some of the key expected outputs include;

- Five maize driers established in each of the five sub counties,
- Twenty five maize buying centres,
- Five subsidized fertiliser distribution centre,
- Cold storage facilities in each sub county,
- Grains storage facility in every sub county.

Anticipated Outcomes/Impacts

- Reduced post harvest losses by 50%
- Enhance value addition for agricultural produce
- Increased income to farmers from the sale of crops produce

Conditions Favouring Maize Farming in Kenya

Warm temperatures above 15^{0}C.
These are experienced in most parts of the country.

High rainfall of 1, 200 mm -2, 500 mm.
However, maize flourishes under different rainfall regions and at times tolerates rainfall totals between 635 mm to 1,145 mm or even adapt to semi-arid regions with rainfall totals of below 380 mm.

Rich, well drained light loam soil.
However, it also tolerates a wide range of soils found in most parts of the country.

Undulating landscape.
This allows for use of machines. A good example is the topography of Trans Nzoia and Uasin Gishu Districts which has facilitated large scale maize production.

Sustainability of Maize Production in Kenya

Since maize is adaptable to a whole range of climate conditions, it is the single most extensively grown crop. However, the chief growing areas are Trans Nzoia, Nakuru, Bungoma, and Uasin Gishu counties.

Since its introduction in the 1500's, maize has become a major staple crop in Kenya as well as an important component of rural livelihoods. An estimated 39 million Kenyans depend on it as their main food source. However, climate change and extreme weather, as well as emerging diseases and pests, threaten maize production and food security in the country. Maize and its partners are dedicated to finding sustainable solutions to the many challenges faced by African farmers and consumers.

The Maize Value Chain in Trans Nzoia County

The main functions entailed in the maize value chain are: input supply, production, storage and trading, processing, marketing and consumption. At the input supply level the main actors are input stockists, seed companies and seed growers. At the production level the main actors are large, medium and smallholder farmers.

Transporters, local and regional traders, the National Cereals and Produce Board, warehouse receipt

system facility owners and the farmers themselves are the dominant actors in storage and trading. At the processing stage, posho millers, small millers and large industrial millers are the main actors. The marketing function involves retail shops and kiosks, supermarkets and wholesalers who supply to the consumption function of the chain. The main actors in consumption are households, institutions, animal keepers, hotels and restaurants, animal feeds, manufacturers, maize and maize seed exporters.

Production Issues

Maize was identified as the most important crop/ enterprise in Trans- Nzoia County with 44.1 percent of the farmers indicating that it was the most important enterprise on their farms followed by Dairy Cows (32.99%), tomatoes (6.3%) and passion fruits 6.0%. In terms of the proportion of land allocated to crops, maize occupies the highest proportion (6.1%), followed by dairy at 5.6% and coffee at 4.3%. Over 70 maize varieties have been developed by seed production agencies in Kenya; and of this total, 7 varieties are predominantly grown in Trans Nzoia County.

The most popular maize varieties planted in the County are H6213 planted by 48% of the farmers; followed by H614 planted by29% and H629 by 20 percent.

Other varieties grown include 691, H6218, 516, 520 and 628. Regression results indicate that maize variety is a significant determinant of maize yield accounting for 53% of the total. The H6218 variety recorded the highest mean yield at 21.4 bags per acre followed by H6213 and 691 both with a mean yield of 15.9 bags per acre. Although a large proportion of farmers plants H614, the mean yield is lower than the other popular varieties at 14.1 bags per acre. Other attractive characteristics such as the heavy weight of the grain and reduced susceptibility to rotting contribute to making H614 remain a popular variety among farmers. Following the results of the VCA Survey therefore, one of the most important opportunities for the County is for farmers to increase their yields by planting higher yielding varieties.

Maize in the County is mainly produced by small-scale farmers who account for 67 percent of the total production. This category of farmers typically follows the low-input, low-output maize production systems, characterized by limited access to agricultural credit; limited and inefficient use of fertilizers, high yielding maize varieties and improved seed; and sub-optimal pest and disease control measures.

The medium scale farmers with more than 5 acres but less than 50 acres account for 28% of the total; while large scale farmers with more than 50 acres account for only 4 percent.

According to the County Value Chain Survey, large scale farmers achieve on average a yield of 23 bags per acre which is higher than the 15 bags per acre achieved by small scale and medium scale farmers. It is important to note that small scale farmers achieve 65% productivity of what the large scale farmers achieve; and yet they both face the same production costs. This result also shows that there was potential to raise the average yields for smallholder and medium scale farmers from 15 bags to 23 bags per acre by merely adopting the technological practices of the large scale farmers in the County.

Expensive inputs

Poor access to agro-inputs such as fertilizer, hybrid seeds, herbicides, contributes to low maize productivity. Low application of the agro-inputs creates inefficiency in production by reducing the yield potential. The Survey reveals that yields in the County have dropped from the 30 bags per acre previously realized in the 1980s to the current levels. The inadequacy of the inputs is compounded by below-recommended rates of application (one 50 kg bag on average); lack of training in application and use of fertilizer formulations not appropriate for the prevailing soil conditions.

Application of fertilizer

Farmers in Trans-Nzoia obtain fertilizer from both commercial suppliers and the National Cereals and Produce Board which supplies government subsidized fertilizers. Commercial suppliers account for over 80% of total availability. According to a survey by the Tegemeo Institute, the proportion of farmers using fertilizer for maize production nationally has been increasing – from 56% in 1996 to 70% in 2007. However, the rate of application has not increased as much; rising marginally from 56 kg/acre in 1997 to 59 kg/acre in 2007. A rates study indicates that 85% of maize farmers use less than the recommended rates; which factor can part explain the decline in yield particularly among the small-scale farmers. The studies indicate that adequate and appropriate application of fertilizers on maize can raise yield levels by between 36% and 70%.

No soil Analysis

From the VCA Survey, 56 percent of the farmers in Trans-Nzoia did not determine their fertilizer requirements before applying any to their crop.

The problem in Trans Nzoia is therefore, not that of widespread application of fertilizers by maize farmers; but rather, that of underapplication – relative to recommended rates. Related to this is the problem of applying fertilizer types not compatible

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with the prevailing soil conditions. Available literature (Compete – 2010) indicates that smallholders in Kenya apply fertilizers indiscriminately without regular soil tests. This aspect was corroborated by the County Survey, which confirmed that over 86% of the maize farmers had never conducted soil tests on their farms to determine the appropriate fertilizers needed for soil fertility. It is increasingly observed that long-term application of certain fertilizer types in the County has led to increased soil acidity. It is, therefore, imperative that the short-term fertility needs of maize, and the long term needs of the soil in the County be urgently determined.

Expensive fertilizer

According to the County Survey, farmers indicated that costly input prices were one of the key factors affecting their performance. The cost of fertilizer in maize production in the County accounted for 25 percent of total production for a bag of maize in 2013; up from a national average of 19% in 2007. A significant proportion of the fertilizer cost is due to high transport costs as the bulk of the fertilizer is transported by road from Mombasa, which is more expensive relative to rail. Following the persistent outcry by farmers regarding high fertilizer costs, the Government has directly intervened and directed that a 50 kg bag of fertilizer be reduced in NCPB Stores. This development will reduce the share of fertilizer cost from the current 25% to some 14% of the total production cost.

Seed treatment Machine

Utilization of farms

Ninety nine percent of the farmers surveyed reported typically producing maize in one cycle per year implying that the land remains idle until the next planting cycle. It also means that in the intervening period, farmers were not earning any additional income from their farms. The study was however, informed that a new trend was beginning to emerge with some of the farmers growing short season crops that take a maximum of three months to mature. Tomatoes and green maize are some of the most commonly grown off-season crops. They are also popular with the youth who access the farms on agreement with their parents who release to them in between the main crop seasons.

Poor Marketing

The majority of maize farmers sell soon after harvest when prices are lowest. Farmers generally sell to rural assemblers who subsequently sell to larger traders. Some of the farmers sell through their producer groups. On-farm storage is often poor with limited pest controls and aeration in accordance with technical specifications. It is estimated that about 30% of all maize produced is lost after harvest. Trading in maize is characterized by a large number of small-scale traders who collect and store maize for a relatively short period (about 4 months), prior to release in the market. They sell maize in trading centres, along roads and highways either in bulk or retail amounts.

Linkages

The traders own and use mobile phones as a major source of information on trends in the market. Trade in maize is not characterized by written contracts at this level. One important strategy for improving the maize value chain for farmers in Trans Nzoia is to assist them create forward linkages with processors who need regular and predictable supplies. Processors can enter into contracts with farmer associations or groups particularly those under a WRS arrangement, to obtain predetermined quantities of maize and offer the farmers guaranteed prices.

Maize Hoarding

Small scale traders play the important role of collecting maize offered for sale from farmers for resale to wholesalers or for storage to resale at an appropriate time. They typically move in the villages with hired (or own) trucks and buy surplus from farmers. Some of the farmers sell directly to wholesalers, NCPB or millers. In addition to the local traders, there are Regional traders who operate as long-distance traders with enough cashflow to finance inter-country trade. Their operations are on a nationwide scale with expansive warehouses in key market cities such as Nairobi and Mombasa. They also rent storage in major producing areas in Kitale, Eldoret, Turbo etc. They own trucks to transport the maize they buy.

Regional Traders own storage from 500 to 20,000 MT capacity and are in the business to speculate, enter supply contracts with millers and other processors. This category of traders can handle quantities of between 5,000 MT to 10,000 MT of maize each year and can take out bank loans to finance their activities. Under contract arrangements with farmers, regional traders have the capacity to finance farmer inputs.

Agro-processing

The main players involved in processing in Trans Nzoia are mainly posho millers who operate throughout the County; and mill maize into flour for household consumption. The County does not have millers or processors of maize on an industrial scale. Value addition opportunities at this stage include milling for maize based food products such as flour for ugali, breakfast cereal products, poultry feed, industrial beer making, baked products etc. Other products that could be obtained through wet milling include cornstarch, corn syrup for confectioneries and corn oil.

Marketing Information

Market information is important to enable farmers discover the real and price for their produce. The lack of information creates imperfections in the maize market, and reduces reliability in supply. Most farmers in the County are faced with the problem of lack of market information which could enable them maximize returns on their investment. Information is lacking on important aspects such as market price, demand, availability of maize, quality and general market behaviour. The marketing chain has many speculative traders and agents who dominate the maize value chain. The inimical aspect of their presence is that they collude to drive down the farm gate prices.

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. An important and emerging avenue for improving farmer revenues from maize sales is to explore the opportunity for collaborating with large business owners to rent out storage space under the Ware House Receipt System.

Low Prices

Most of the farmers in the County are small-scale who produce small quantities, which are not attractive to large buyers. Such producers are, therefore, not exposed to better market bargains and so resort to selling to local traders who accumulate; and who normally purchase the crop in volumes rather weight. The traders however subsequently sell in weight thereby gaining from the additional kilograms obtained from farmers. There is opportunity here to upgrade this node in the value chain so as to benefit farmers who are short-changed at the farm gate or the local purchasing centres.

Marketing Channels

Several players are involved in the marketing sector of the maize value chain. These include farmers; local traders; the National Cereals and Produce Board; transporters; processors (both local posho mills and medium – large scale millers); wholesalers; retailers of flour and other derivatives; consumers; animal feed manufacturers and livestock keepers. Overall, the marketing of maize in the County is through various channels:
Small-holder farmers selling their grain to local households and local traders. This channel is most active soon after harvest with maize traded being mainly for household consumption or accumulation by local traders. According to the County Survey, 72.3% of the maize farmers sold their produce to neighbours and local traders;

The second channel involves small and medium local traders selling maize to regional traders who inturn sell the maize to large flour millers, the NCPB and animal feed manufacturers. The survey showed that 17% of the farmers sold to NCPB while 9.4% sold to millers. Only 0.5% sold to local warehouses.

At the upper end of the chain, the channel involves the NCPB selling maize to millers who inturn sell flour to wholesalers and retailers including supermarkets.

Maize Granaries of Kenya

Your Ability to Analyze 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** got hold of George Hopf then General Manager Panacol.

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 is 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 Cereal 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.

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 as diseases (smut), 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 is 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 prep, planting, weeding, top dressing, and Harvesting). Farmers should also ensure the 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. 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 un recommended dealers as fake products can cause losses. Small 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.

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"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 practice everywhere as it provides the stable meals of most Kenyans but nowhere else it is done in the scale of Trans Nzoia."

Traditional Maize Granary

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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 circles of famine after some years?

The government should support farmers but most of 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 loss 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. Where this has been tried in Galana it is said 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 paractices are well adhered to. The bigger the size of the field, and production per acre, the less the cost of production.

ITEM	RATE/ACRE(30bags)	PRICE/UNIT	TOTAL
Fertilizer (DAP)	2 x 50kg	3000/-	6000/-
Fertilizer (Urea)	2 x 50kg	2800/-	5600/-
Agrochemical (Herbicide)	1.6lt	1800/-	2800/-
Seeds	10 kg	180/-	1800/-
Labour (Weeding, Planting)	1	1440/-	1440/-
Machinery (ploughing, harrowing spraying planting)	1	3500/-	3500/-
Post harvest (stacking, cobs harvesting, transporting shelling bagging)	1	4500/-	4500/-
Technology (drier, weighing, transportation)	1	1500/-	1500/-
Cost of sale /admin	1	1500/-	1500/-
Total Cost	30 bags		28,640.00
Cost per bag	1 (90Kgs)		954.60
cost per kg + Levy cut	1kg		10.61
Land Cost Per Kg	1kg		1.39
Total Cost	1kg		12.00
Selling Price December 2016	1kg		22.00
Profit	1kg		10.00

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.

A new post–emergence selective herbicide for control of broad leaf weeds and grasses.

Avena fatua *Setaria viridis* *Emex australis*

**Brome Grass* *Galium aparine* *Malva parviflora* **Amaranthus (terere)*

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In this Edition of *Cereals Magazine*, We Caught up With One of Monsanto's Female Leaders in Agriculture to Understand What Drives Her. Excerpts:

Meet Monsanto's Everlyn Musyoka - One of the Women Leaders in Africa's Agriculture

Who is Everlyn Musyoka?

Everlyn Musyoka is the Commercial Operations Lead, Monsanto in charge of the corn and crop protection business for Kenya and Uganda. Everlyn is an experienced professional with ability to lead innovations, productivity improvements and sustainable revenue growth. She is knowledgeable and experienced in areas of finance and administration, business development as well as sales and marketing management having worked as an Accountant, Sales Representative, Departmental Manager as well as Commercial Operations Management.

My career began at Amiran Kenya Ltd where I gained valuable insights in agribusiness especially in the seed sector.

There is much more to me inside and outside Monsanto. I am currently an executive member of the Board -Seed Trade Association of Kenya (STAK) a membership organization drawing members from various actors in the seed value chain both the public and private sector. In addition, I serve in the Special Interest Group (SIG) -Field crops for the continental seed body Africa Seed Trade Association (AFSTA).

I am passionate about consistency, efficiency and profitability, key factors that lead to enhanced responsiveness to customer needs as well as business sustainability. This is what keeps me awake at night as I strive to improve myself or acquire new skills relevant to this dynamic sector. I am a certified business processes and performance consultant.

How would you describe your time as the Commercial Lead Kenya -at Monsanto? Are you passionate about what you do?

My journey as the Commercial Lead has been quite exciting. I have gained various competencies and leadership insights along the way. I have been given equal opportunities to learn and develop myself as a leader and I have come to appreciate that gender is not a barrier to success. Success is a mindset.

I am passionate about what I do. I am driven by a burning desire to positively impact lives of people around me, the team I lead including our farmers who keep us in business. I am passionate about people. I want to leave a positive impact as I engage with various stakeholders within the industry as well. Continuous self-development and that of my team are central to staying abreast in this exciting industry that touches lives of millions.

What is Monsanto's vision in the region?

Monsanto is all about sustainable Agriculture, improving lives and creating long-term shareholder and stakeholder value amidst the daunting challenges of climate change, growing population and declining arable land amongst other global challenges. The team at Monsanto work collaboratively with stakeholders to improve livelihoods around the world. In Africa, we are working alongside farmers and other partners to make agriculture more sustainable, more productive and profitable so that growers can meet the demanding needs of today while preserving the planet for tomorrow's generation.

Kenya is home to Monsanto's headquarters in Africa and is currently operating from 3 sites in the country. Our Africa Headquarters in Nairobi are located at Westcom Point Building in Westlands off Waiyaki Way, at Mahiga Mairu Road.

How significant is maize to Kenya's agriculture and how does Monsanto relate with farmers?

In Kenya, like in most of Sub Saharan Africa, agriculture is the backbone of the economy with maize as a staple food product constituting 87% of household diets in Kenya alone. 75% of the Kenya population is dependent on agriculture either directly or indirectly.

We continuously engage farmers as our number one partners and work towards delivering transformative agricultural products and solutions that meet our growing food needs while conserving our natural resources and the fragile environment.

STAK Congress 2016. Seated front row L-R Everlyn Musyoka-Monsanto, Dr. Esther Kimani MD Kephis, Captain Karanja- Chairman STAK, Cabinet Secretary, Honarable Willy Bett and Dr. Florence Wambugu, Africa Harvest

There is a huge opportunity for farmers to experience our high-quality brands and other technologies enjoyed by grower's worldwide.

What are your top priorities?

Success in agriculture starts with farmers having access to quality seed and adherence to the correct agronomic practices. At Monsanto, we believe that farming can be a lucrative business. As a leading global provider of agricultural technology-based tools and products, our priority is to provide effective support to our farmers by assisting them to access our quality products so that they improve farm productivity/yields and food quality at competitive prices. By availing high quality seeds (Dekalb and Seminis brands) to farmers in the sub Saharan region we will also continue to educate farmers on the benefits of conservative tillage and expose them to the benefits of the crop protection portfolio that includes Roundup and guardian Max brands.

Everlyn Musyoka and Johnson Thaiya, at a field event

In a nutshell describe Monsanto products and services to the farmers

Maize Seeds:

At Monsanto, we pride ourselves in the quality of our seeds and agricultural innovations. Our primary goal is to provide excellent seed varieties. In Kenya Monsanto offers hybrid maize seeds under our DEKALB brand with the various varieties suited for different maturity periods, climatic conditions and altitudes. Our DEKALB varieties are known for the strong specs that include high yielding varieties, drought tolerance, resistance to diseases such as Leaf Rust, Maize Streak Virus (MSV), Grey Leaf Spot (GLS) and Diplodia. In November 2016, Monsanto successfully unveiled a new maize variety in the market (DK 777) that is tolerant to MLND for farmers in the mid rift areas of Bomet and surrounding areas.

DEKALB hybrid varieties are responsive to good management and thus yields can be enhanced by adopting good agronomic practices.

Vegetable Seeds:

Farmers in the region have reaped the benefits of hybridization overtime. Seminis has led the way in ensuring accessibility to very high quality vegetable seeds that include; Tomato, onions, French beans, Sweet peppers, Cabbages, Watermelons, Cucumbers, Carrots and Brocolli.

Seminis is focused on developing products that reduce the need for agricultural chemicals, increase crop yields, longer shelf life addressing the constant post harvest challenges as well as better tasting foods with higher nutritional content.

Crop Protection:

In addition to our DEKALB and SEMINIS brands, we manufacture Roundup, the world's best selling

herbicide which is used for weed control by both large and small scale holders. In Africa, Roundup has been a popular choice for farmers for over two decades. We've got a range of selective herbicides in our portfolio as well.

Briefly discuss the Monsanto team

One of Monsanto's strength lies in the quality and deep experience of our people. We have a highly qualified and motivated team. We value diversity and developing teams is core to our business. The team is multi-cultural/multi-racial and highly empowered -acting local whilst thinking global. The HR Team focuses on talent acquisition and development. We are a highly collaborative team focused on serving the customer and striving to deliver value and great experiences to our stakeholders in the region and beyond.

Lately we have seen a more aggressive seed sector, what can you attribute this to?

Food security is central to many national governments and international agencies such as the United Nations. The need for food security, improved livelihoods, advancement in technology and an informed farmer has immensely contributed to the rapid growth in the sector. Enabling seed policies and regional harmonization has contributed to this growth as well. As the world's population continues to grow and climate change remains an issue, the seed sector will assume greater significance.

What's the biggest challenge YOU feel your farmer faces, and how do you inspire the rest of the team to meet it head on?

At Monsanto, we see challenges as new opportunities. Access by our farmers to quality seeds and modern agricultural technologies is key. Untapped opportunities with hybrid seeds especially for farmers who are still using open pollinated varieties, small scale holders who still don't have access to high quality seeds as well as access to agronomic extension services will be key in seeing farmers reap higher yields and returns. This in turn will help transform and modernise agriculture across all geographies.

Everlyn addressing delegates at a forum

Where do you see the seed sector globally in the next 5 and 10 years from now? How are you prepared for this change in the industry?

This is largely speculative. Agricultural technology shall continue to take centre stage as the reality of climate change and reducing arable land in the face of a growing world population becomes apparent. Within the region we anticipate more regional harmonization based on economic blocks and more sector enabling policies.

What is your personal work ethic, and how does this affect the company culture?

Hard work and competency is key to every successful venture. Strength of character and integrity is critical and is part of who I am. I endeavour to network professionally, challenge and stretch myself while continuously learning to improve my skills. In Monsanto, personal development is quite critical and am glad to have people who coach me and mentor me to be a better leader. The biggest room in this world is the room for continuous improvement!

What decisions have you made in your career that you look back on and feel were mistakes and what have you learned from them?

Keeping my eyes on the prize amidst an environment where distractions are inevitable. I think every failure is a learning opportunity. I see lots of positive things along my career path and I celebrate the successful moments I have enjoyed along the way.

Describe your ordinary day? Do you have enough personal time?

I am very lucky to work for an organization that advocates and encourages work life balance. With proper and careful planning, you can always achieve your business goals as well as your personal wellbeing. I am also privileged to work for a respected agriculture multinational that believes in and promotes women empowerment.

Everlyn Musyoka celebrates a successful maize harvest with a small holder farmer.

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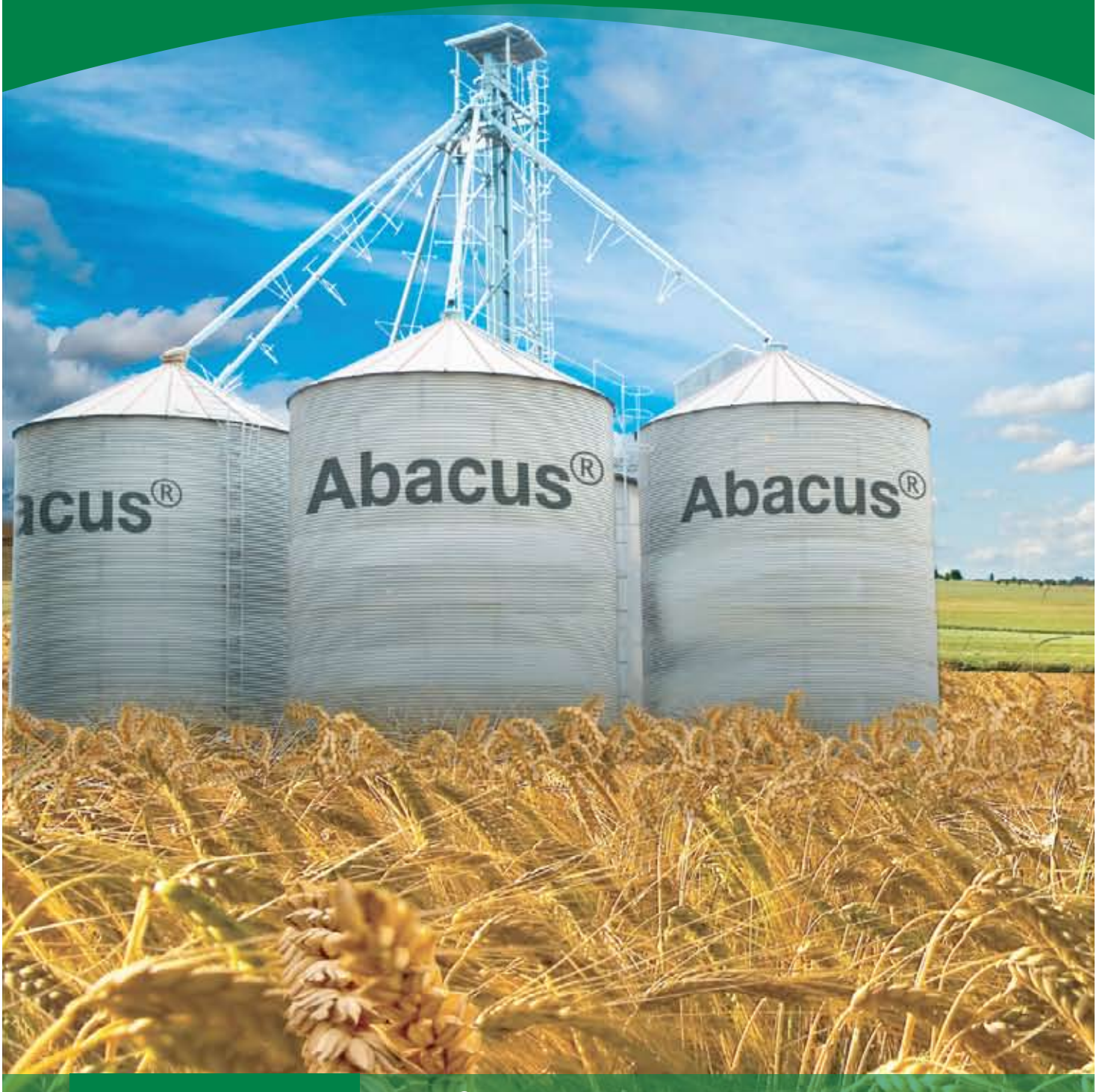

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Mercy of Nature to Feed Self

Environmental experts tell us that only 20% of the country receives adequate rainfall in any good year; meaning the rest 80% is perennially water starved.

It is unfortunate, though, that, we have created cyclic pattern, where every few years, the country is brought down to its knees by drought and the attendant famine and water crisis. Environmental experts tell us that only 20% of the country receives adequate rainfall in any good year; meaning the rest 80% is perennially water starved. Yet the country has put itself at the mercy of nature to feed itself such that in the event of diminished rains, we are hit with monumental crisis.

We must confront the current crisis urgently but move beyond such knee-jerk reactions since we can plan and guarantee food security through irrigation and modern farming methods; and safeguard the So what goes wrong? When shall Kenya have enough food?

Way Forward

The allure of mega-farms as solution to food security persists. You can count on a few white elephant schemes in the making, and our own is looking like a prime candidate.

Food security is seldom ever a production problem. Food security is defined as availability, accessibility, adequacy and acceptability of food. Each of these requirements is important for example; pork, beef and meat are not acceptability criteria for Muslims, Hindus and Vegetarians respectively. We have two types of food insecurity in Kenya, chronic and episodic. What we are experiencing now is episodic type but ordinary times, close to half of Kenyans are malnourished and a quarter would afford to meet the daily calorific requirements at all times. The vast majority of our food insecure are poor rural households, that is, food producers. Even now, we have not heard of urban poor being fed, In essence then, our food insecurity problem is poverty problem.

Government Policy

There must be deliberate political and policy shift to other ways and means of ensuring food is available, accessible and affordable. True, setting aside a tenth of the budget for agriculture is a big deal for poor countries often faced with competing priorities. But success in agriculture reduces the pressure to finance solutions to social problems caused by hunger and poverty. Putting money into agriculture is a smart investment.

County Governments

Community ownership in irrigation and water management will be crucial and this brings into focus the role of county governments in driving agriculture as a devolved function.

Smallholder farmers, who hold over 80 percent of all farms in Kenya, are struggling to adapt to rapidly rising temperature and erratic rains. These farmers are now facing the risk of being overwhelmed by the pace and severity of climate change.

Farmers are already contending with an increase in average temperatures, with further increases of between 1.5 and 2.5 degrees centigrade expected by 2050.

Despite a decade of pro-growth and food security policies and millions are chronically malnourished with some dying of hunger. As climate change turns up the heat, the country's food security and its ability to generate economic growth that benefits poor - most of whom are farmers - depends on the ability to adapt to more stressful conditions.

There is severe drying across the country hence need to adopt technologies and "climate-smart agriculture" that will help make crops more resilient to future extreme weather events. Forget "blanket" advice about soil health Erratic farming practices (such as the failure to apply mineral or organic fertilizers), and soil erosion, are depriving croplands across the country of 30-80kg per hectare of essential plant nutrients like

phosphorous and nitrogen.

Soil Scientists' says the country should not only engage to reverse the current trend of low crop productivity and land degradation, but also forget blanket recommendations regarding fertilizer applications to their soils. Fertilizer promotion programmes are often unsuccessful because they are designed with a "one-size-fits-all" philosophy - failing to recognize the diversity of production systems and the range of farmers'.

To keep the soil healthy, farmers should apply the right fertilizer at the right time, and in the right way at the right time as the soil types in the county, or even within a given country, are not the same. There is need to lose the usual blanket recommendations.
Kenyans need to map their soil and, in the case of some regions, should update their maps. Mapping would be "crucial" to know exactly where fertilizers should be applied or not. "In cases where there is no deficiency of some nutrients, farmers should not end up losing investments in fertilizers.

"To keep the soil healthy, farmers should apply the right fertilizer at the right time, and in the right way at the right time as the soil types on the continent, or even within a given country, are not the same.

Affordable and Accessible Agrochemicals and Fertilisers

As a nation we have to decide whether we want to develop a vibrant pesticide industry to effectively support farming or kill it all together. As it is we are slowly but surely killing the industry by saddling it with taxes and levies.

The 2013 VAT act introduced 16% on all imported ingredients of pest control products for local processing or formulations. In addition to VAT, the active ingredients, carrier materials, solvents and emulsifiers attract an import duty and 25% excise duty for imports. Local formulators incur VAT on these substances as well as on packaging materials, labour and transport.

The negative impact is evident. This is directly pushed to the farmer. This becomes tough for farmers to coax their shambas and produce enough for consumption and extra for sale. We must therefore acknowledge that this is slowly killing the industry through reduction of usage of farm inputs hence compromising the yields. This in turn has a major effect on food security, leading to a litany of socio-economic and political implications.

A proper policy on reduction of fertiliser costs is very important. It should involve supply chain management, blending and manufacturing of fertiliser. This will require multiple initiatives especially farmer's capacity building, correct estimates of annual fertiliser usage, efficient procurement and distribution systems, storage and transport.

It is clear therefore that a significant investment in agriculture is key to resolving our challenges in food self sufficiency, employment, economic development of ASALs and the condurum around land ownership and land management.

Fertilizer use in Kenya remains low compared to other regions, with average use at around 10kg per hectare, while the global average is over 100kg per hectare. Kenya needs to work on two areas to improve the current situation.

First is to improve the logistics around fertilizer distribution, about 40 percent of the cost of fertilizer in Kenya is due to transport from ports of entry to the farmer. Secondly, there is need to have farmers improve their financial access to fertilizer. The private sector's increasing participation in fertilizer programmes, from procurement to transportation of fertilizers to various outlets, is a "courageous effort" to change smallholder farming.

Government should introduce a large-scale national programme to subsidize agricultural inputs (mainly

Silos for grain storage

fertilizers for maize production), targeting more than 1.5 million farming families. The result will be increased maize production and real incomes.

Introduce new crop varieties

While it is important that the country moves out from dependency on rain-fed agriculture maize, investments in better information technology and modern agro-technologies to increase production, preservation and better use of food, investment in high value seeds is inevitable. Without value addition is of little value.

The stagnant state of commercial seed production is often cited as a key reason why yields per hectare in Kenya for staple crops like maize are up to 80 percent below what farmers outside Africa achieve.

According to sector players, more work is needed to improve seed systems in Kenya, through encouraging local research institutes and locally-owned seed companies, and installing mechanisms to reach farmers with the "improved" seeds.

After attempting to tweak their seed system, large scale farmers have seen positive results in identifying and breeding seeds that are suitable for planting in a particular environment. Most farmers who invested in improved crop varieties achieved yields 50 to 100 percent above local varieties.

> "The sector may seem more appealing; when one considers the amount of money Kenya invest in food imports. "When I hear US$35 billion food [imports to Africa annually], as an entrepreneur I say 'what an opportunity'," said Strive Masiyiwa, an African telecoms mogul.

Get the youth involved

Agriculture contributes one-quarter to one-third of Kenyan GDP but employs 65 to 75 percent of the labour force. The worrying factor is, African youth see agriculture as an "outdated, unprofitable" profession.

More investment is needed in rural and food sector entrepreneurship, particularly among Kenya's growing youth population, for the country to achieve food security.

Experts agree that the youth should be informed more about the benefits of this opportunity. This can be achieved through vocational and business management training for the youth, adequate and affordable financing for starting and growing enterprises, and by creating enabling environments for entrepreneurship on an individual and collective basis.

Make use of the "brilliance of women"

Female small scale farmers dominate the agricultural landscape in most production environments in Kenya. Yet they constitute the majority of rural actors locked in socio-cultural structures that limit their agricultural productivity, efficiency and effectiveness at all points across the value chain.

The issues of equity should be embedded in all aspects of agricultural production. Women are too often left out of decision-making processes and food security will not be successful if "we continue to deny the talent and brilliance of the women who comprise 50 percent of our population."

Only 55 percent of women in Kenya are literate, compared to 70 percent of men; about 35 percent of women achieve higher education. By focusing on building the capacity of young people and women in particular, Kenya will be able to increase the productivity of a large proportion of their labour forces.

Manage more water, irrigate more land

Irrigation reduces reliance on rainfed agriculture. Several delegations have visited Israel to learn what they do. But to date no tangible benefits have accrued from the visits. Four years ago, the government invested in Galana/ Kulalu, it is still in its infancy. Another project in Turkana has also gone begging. Invested at the household and community level, the Galana/Kulalu billions would be enough money to get each and every one of these households out of food insecurity.

It is perhaps time to look for alternative ways to approach irrigation. It may involve investments in small dams using supplementary irrigation

systems to reduce energy running costs. Only 4 percent of Kenya's crop land is irrigated, according. The rest depends on increasingly erratic rainfall. But water management can mean much more than irrigation.

Water productivity in agriculture will be affected by climate change as more active storm systems emerge. Greater variability in rainfall is expected, which will increase the risks of dry-land farming. The demand for irrigation will grow [in terms of area] and irrigation water use on existing crop areas will increase due to greater evaporative demand. The water resources available for irrigation will become more variable, and could decline in areas with low rainfall.

Total agriculture land increased by some 8 percent in the last decade, while the irrigated area remained stable, after a steady increase 1960 to 2000.

However, agricultural productivity can be greatly increased through integrated watershed management that takes into account the full water budget for an area, as well as its use, output, and cost/benefit ratio.

Accordingly, collecting rain in ponds or barrels, and other "rain harvesting" techniques, offers a simple but underused low-technology approach to climate change, harvesting only 15 percent of the country's rain would more than meet the water needs of the country. Rainwater harvesting for underground storage, for instance, could be "used for supplemental irrigation of high value crops".

Follow climate-smart mechanization

Motorized equipment in Kenya contributes only 10 percent of farm energy, compared to 50 percent in other regions. Mechanization can improve productivity and nutrient use efficiency, reduce waste and add value to food products. But progress in this area, scientists note, should be based on energy efficient innovations, including the use of alternative energy like solar-powered irrigation pumps, and supported by better training and repair services and by strong farmers' organizations.

Mechanization "isn't all about great big machines, but small machines that smallholders can use". But the point is that they need to be made, and that often requires young workers; they need to be repaired and that creates jobs; and in this case the machines go from farm to farm, which involves yet another service.

Reduce post-harvest losses

Post-harvest loss is the most unanswered and ignored challenge to food insecurity in Kenya, with losses exceeding 30 percent of total crop. Simple solutions such as training farmers on post-harvest handling, food management training on appropriate pre-and post-harvest handling operations and improving market access and knowledge of market requirements would significantly reduce losses.

Famers need to have "better access to storage facilities" and access to new technologies to reduce losses, which exceed the total amount of international food aid provided to the country annually.

Additionally, it is also important to:

Halt farmland expansion.

Reduced land clearing for agriculture, particularly in the rainforests, achieved using incentives, such as payment for ecosystem services, certification and ecotourism, can yield huge environmental benefits without dramatically cutting into agricultural production or economic well-being.

Close yield gaps.

Many parts of the country have "yield gaps" caused by farmland that is not living up to its potential for producing crops. Closing these gaps through improved use of existing crop varieties, better management and improved genetics can increase current food production nearly 60%.

Use inputs more strategically.

Strategic reallocation could substantially boost the benefit we get from precious inputs. Water, nutrients and agricultural chemicals are used too much in some areas and not enough in others.

Shift diets.

Growing animal feed or biofuels on top croplands, no matter how efficiently, is a drain on human food supply. Dedicating croplands to direct human food production could boost calories produced per person by nearly 50%. Even shifting non-food uses such as animal feed or biofuel production away from prime cropland could make a big difference.

Reduce waste.

One-third of the food farms produce ends up discarded, spoiled or eaten by pests. Eliminating waste in the path food takes from farm to mouth could boost food available for consumption by another 50%.

A pile of food waste

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Boosting 'Crop Per Drop' Could Cut Water Usage

Agricultural production is mostly rain fed and this leads to food deficit and insecure food supply as a result of periodic droughts and low access to production resources. According to the National Development plan Kenya is classified as a water scarce country with water demand exceeding renewable freshwater sources. Agriculture water consumes about 79.1% of the total water withdraws with industry using 3.7% and domestic purposes consuming 17.2%. The total water withdraw by 2003 was 2,735x106m3 year-1 for irrigation, livestock and domestic use 470x106m3 year-1 and industry 100x106m3 year-1. The irrigation supply is from groundwater and surface supplies that are estimated to 1 and 99%, respectively.

"In many cases low water productivity is likely to be a function of low yield, researchers believe. Techniques such as terracing, nutrient addition or furrowing could improve crop yields even when limitations are due to soil or slopes."

Kenya still has a few irrigated areas of 3% of total cultivated area. The challenge of realizing food security is still far from reality. Kenya has a higher potential of rain fed production as it has an average annual rainfall of 630mm as compared to South Africa which has 495mm. In both countries, grain and cereals are main crops with maize as the staple food. While there are several efficient water irrigation systems, those used in the two countries are mainly traditional furrow and overhead sprinkler systems, which use too much of the limited water resources. The irrigation sector has focused on large scale canal projects that deliver large quantities of water, large groundwater projects and high pressurized sprinkler and drip systems that are too expensive for small holders. The missing piece in global irrigation is systems designed for poor farmers and for small plot farms.

Crop Production

Agriculture currently consumes more freshwater than any of man's other activities. And demand for both food and water is growing fast. With that in mind, it is important to examine how many calories are created for each litre of water consumed.

Crop water productivity varies a lot, even between places that have about the same climate. This means that some areas have a 'water gap' – they could be getting a lot more crop per drop. A deeper research can help the government decide which crops to focus on, in which places, to best boost water sustainability and food security.

In such most areas around 60% of water consumption currently goes to production of just 20% of food calories. Kenyan scientists can calculate the improvements in water use that could result if crop water productivity in precipitation-limited areas was raised to the 20% for all crops

Rain-fed croplands could feed the currently hunger stuck millions each year without consuming more water. Irrigated areas, meanwhile, could save enough water to meet the annual domestic water demands of other millions without decreasing food production.

In many cases low water productivity is likely to be a function of low yield, researchers believe. Techniques such as terracing, nutrient addition or furrowing could improve crop yields even when limitations are due to soil or slopes. Measures such as reducing wind-driven erosion, changing planting dates, rainwater harvesting and local water storage, drip irrigation, or changing tilling practices to reduce evaporation could also help.

The on-the-ground changes farmers make – things like using more fertilizer to increase yields – will differ from place to place. What this shows is that those changes could add up to something big.

To get the true facts, Kenyan researchers should analyse a combination of modelled and empirical data for crop production, water use and crop water productivity for wheat, maize, rice, barley, millet and sorghum among others. They can define crop water productivity as edible kilocalories produced per litre of evapotranspiration, which can be evaluated separately for rain-fed and irrigated crops.

There will definitely be a large range in crop water productivity; in large parts of Kenya, the value for maize will definitely be less than one kcal per litre, compared with values of other Maize growing areas in South America or even South Africa.

"We chose to focus on places with really low water productivity that were in precipitation-limited regions – low water productivity cropland because it should be easier to improve really poor performers than really high performers, and precipitation-limited regions because they plausibly could really benefit from using less water to produce food," said a maize grower.

Raising crop water productivity to 20% in precipitation-limited regions could increase the total rain-fed food production in Kenya by more than 10% without exploiting additional cropland. And similar improvements in water productivity on irrigated cropland could reduce total water consumption by around 8–15% in precipitation-limited regions Asia, Europe and South America.

So what's next? "Efficiency is obviously most important in places where resources are scarce, so it will be exciting to integrate such a research on crop per drop with research about water stress.

Cater to Your Soil's Needs

Soil type and organic matter play a significant role in whether or not your farm has a nutrient deficiency

You're always pushing for better yields, and all the pieces finally fell together. Record or near-record yields across the country not only topped off grain bins but also depleted soil nutrients. As you plan for your next crop, it's important to replenish soil nutrients so yield isn't held back from reaching its potential.

The availability of nutrients changes during the year due to biological, chemical and physical properties," says a soil scientist. "Using the same nutrient program [year over year] is like going to the doctor and getting the exact same medication without getting any examination to determine the current state."

Carefully consider the impact big yielding crops has on phosphorus and potassium levels in fields. While nitrogen might typically be the first nutrient you think about when it comes to high yields, it's important to consider other nutrient needs as well.

Crops need phosphorus in full form early for root development and as the plant grows to promote healthy stalks, stems and flower production. Potassium plays a vital role in plant growth as well, and deficiency can result in stunted growth, defoliation and weakened response to weather changes such as drought.

When we have poor fertility we're much more susceptible to any deviation in weather. Going through any stress is harder when you don't have the fertility you need. Soils should have at least 50 lb. of phosphate per acre (25 ppm) and 300 lb. of potassium per acre (150 ppm) each season. Be mindful of the three keys to determining soil and crop nutrient needs: soil tests, tissue tests and yield history.

Before farmers apply nutrients each crop season, they need to take soil tests and past yields into consideration. If they haven't tested in a while they should—it helps determine if there are certain fields or areas of fields they need to focus on more.

Use soil tests and tissue tests as the road maps to good fertility. In addition, keep yield goals in mind as they affect nutrient levels needed for the crop. With higher yields crops remove more nutrients so you'll want to monitor fields' year over year more closely. Pay attention to soil type and monitor its potential for leaching.

In addition to keeping soil tests up-to-date, it is recommended to farmers to check on their crops throughout the season by pulling plant tissue samples. Tissue tests give a snapshot of how a crop is using nutrients and how the fertility program is working. Pulling tissue samples is easy. Walk the field and pull 20 samples from 20 different plants scattered throughout. Send in the samples for analysis and wait for the results.

Simply relying on what's been done in the past might not suffice this year. Each harvest pulled out of the field means nutrients are depleted from the soil, and if nutrients are not replenished you cap the crop's yield potential based on what genetics and management could produce.

Wallets might be tight, but you could lose more money in yield loss if you don't cater to the crop and soil's nutrient requirements.

Soil type and organic matter play a significant role in whether or not your farm has a nutrient deficiency. It's important to understand your soil type, know what your yield took out of the soil, what your yield goals are for 2017 and what nutrients you need to apply to restore the soil and be prepared for a productive season. If you're not collecting yield and soil data you need to start. Keep records and learn to use them to plan into the future. Learn to manage soil to avoid yield loss from deficiencies Knowing the value of soil health tests isn't the biggest challenge, a doing is. Do you make it a priority to conduct soil health tests on your fields?

The most important thing is to have a soil test; it's the roadmap that tells you where the soil has been and where it needs to go. Extensive efforts will provide a soil health report card of sorts, specifically on phosphorus and potassium. Low testing soil has a significant risk of yield loss.

If you identify deficiencies in your soil consider the following factors when adjusting nutrient needs:

- Yield history. Higher yields take more nutrients out of the soil.
- Yield goals. If you're going to push yield, you'll likely need to push nutrients.
- pH level. The ease at which nutrients are absorbed depends on pH.
- Extent of deficiency. Application rate and method influence how fast you resolve the deficiency.
- What surplus nutrients might be tying up others.

For example, nitrogen and sulfur work in tandem.

- Patience. It will likely take a few years before you notice progress. Continue soil health tests to monitor progress. As long as the soil is moving in the right direction keep on keeping on.

Soil composition changes, so be diligent about conducting soil health tests and be ready to change your fertilizer program. Take your soil samples and measurements in the when soil moisture are close to capacity. Record the locations using GPS so you can return every three to six years and measure progress as you implement your soil health improvement strategy." You can perform some soil health tests, such as water infiltration, soil respiration, aggregate stability, pH, surface hardness, compaction and density. Other aspects, including stability, texture analysis, active organic matter and mineralizable nitrogen, need to be tested in a lab.

Soil health tests offer a more comprehensive look at what's going on below the ground. Besides testing for macronutrients nitrogen, phosphorus and potassium there is need to test for micronutrients. Over-applying or underapplying any macro- or micronutrient might be detrimental to soil health."

When balanced, the various components of soil work together like a well-oiled machine. When off balance, they can work against each other. For example, if you apply excess nitrogen to a soil with optimum pH, the extra nitrogen stimulates microbial populations. Those microbes release soil carbon, which might be lost as carbon dioxide.

Down the road, you might need to apply more nitrogen fertilizer because you reduced the supply of nitrogen stored in the soil. If you apply an ammoniacal source of nitrogen, which creates acidity, soil microbial activity might be reduced. Then you will need to apply more limestone to correct the acidity."

Farmers who irrigate or apply manure should also test for sodium. Excess sodium prevents clay particles from flocculating [just like hydrogen in an acid soil], so the soil particles run together and structure is destroyed.

It takes extra time and effort, but soil testing and management can help make your soils more productive.

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Implications of Collecting Data on Farm

"Without data, you're just another person with an opinion."

W. Edwards Deming

There's a famous case study in the data analytics world about a well-known American department store chain that learnt to predict when its female shoppers were pregnant by their buying habits. The store discovered that pregnancy signalled a significant shift in female spending habits, so by targeting pregnant customers they could get their attention at an impressionable time in their lives.

This chain of stores got so good at doing this that they sent pregnancy related advertising material to a teenage girl who had been shopping at their stores. The father of the girl was incensed by the material and told the store so, only to have to apologise days later after learning the store had not in fact, made a mistake (Hill, 2012).

As farmers we deal with something that is every bit as complex, dynamic and intricate as human buying habits. We deal with nature and the natural world. Farmers have never before had tools to measure and respond to the natural variability that comes with interacting with the natural world. But the rise of data collection and technology allows us to do just that. Our farms and our soils are not homogenous, but for too long we've treated them as such.

What will the information revolution mean for agriculture? What new approaches, what new ways of thinking do those of us on agricultures front line need in order to adapt our mechanised industrial agriculture into the new reality of the information age?

A new revolution requires new ways of thinking and new approaches to some old problems in order to prosper as a farmer on a data-driven farm. What new approaches, what new ways of thinking do those of us on agricultures front line need in order to adapt our mechanised industrial agriculture into the new reality of the information age?

The rise of a myriad of cheap sensors is combining with the GPS and the promise of near ubiquitous internet access to allow farmers to ask questions about their farms that haven't been feasible to ask in the past. Rather than treat their farms and soils as homogenous farmers can become flexible and adaptable to the natural variations that exist in their environments. Never before have farmers had tools to measure, quantify and respond to the natural variability that exists on their farms like they do today.

Collecting data on farm has transformed from an expensive and laborious process that few farmers could be bothered with, to one that is relatively cheap and increasingly easy. Rather than being a one-off process, collecting, analysing and continually reviewing data can become a system for ongoing improvement on a farm.

Maize Farm

The four data revolution steps encompass the challenge of precision agriculture are:

Collecting

It is possible to collect farm data on virtually any area of farm performance. If there's an area of a farm that a farmer/ farm manager believes can be managed better, then data can be collected to aid in assessing and quantifying an issue. The spectrum of ways to collect data is as wide as the number of issues are on farm to collect data about. From very simple data logging via a smartphone or laptop, through to networks of remote monitoring sensor networks, collecting reliable data is no longer the challenge it once was.

Processing

Once collected, data must be processed into a format that is useful for farmers and advisors to use. Typically, this involves converting large datasets of data into a visual medium, better understood by humans. Examples of this may include graphing weather data, or laying a large series of plant health data points onto a map to give a visual representation of plant growth. Traditionally requiring some expert knowledge to operate, data processing tools are becoming increasingly automated and easier to use, leading to lower barriers to farmer adoption.

Interpreting

With data collection becoming increasingly commonplace on farm and automated processing of that data becoming increasingly automated, it is the interpretation of these pretty maps and well laid out graphs that is the challenge for farmers. Providing an appropriate context to what data points are being analysed and how that is impacting farm performance is crucial to making the most of data collected on farm. Often farmers engage trusted advisors or other outside professional help for this step of the process.

Application

This is the step that makes the previous steps worthwhile. With a newfound understanding of what is happening on farm and some quantification of the issue being investigated, a farmer now has the confidence to change management decisions based on the interpreted data. Making better and more informed decisions on farm is what justifies the expense and time required to capture better farm data. But has the implemented management change had the desired effect? There is now a need to collect data relating to the different farming or management technique to verify that improvements are definitely being made. So the cycle of collecting, processing, interpreting and applying data based decisions is an ongoing one. Each time this cycle is attempted, a farmer learns something more about their operations and how to improve what they do.

Rather than being a one-off process, collecting and appropriately using farm data can become a system for implementing continual improvement on a farm.

> "A new revolution requires new ways of thinking and new approaches to some old problems in order to prosper as a farmer on a data-driven farm

Conclusion

Once accurate data is being collected at the farm level, such data can be aggregated and compared across different businesses, regions, and countries. Farmers can use this aggregated data to analyse farm business performance. The promise of this is the potential for real-time business benchmarking.

Third parties, including well known agribusiness multinationals are becoming interested in farm data at this aggregated stage, because it gives insights into how farmers are using various products. This leads to a strange phenomenon where a company's clients are also doing their product research.

There are many people who believe there is much value to be extracted from this data as evidenced by the venture capital flowing into new companies attempting to make use of it. This may be concerning to farmers who may not understand the motivations behind a company wanting to access farmer data.

There are other longer term implications of data technology in agriculture. Fears about commodity market manipulation may be overstated but concerns about control of data access are valid. Like all technologies there are potential benefits to farmers as well. More open supply chain data may allow for cheaper inputs and potentially even a new revenue stream for some farmers. It will certainly lead to better genetics and machines for farmers to use.

People Skills:

The Biggest Challenge Facing Cereal Farmers

The cereal farming is entering into a period of rapid change due to famine, droughts and climate change. Nationally, crop production will increase, with minimal land expected to be cultivated. As these challenges continue to grow, so does the need for talented employees.

Therefore, good people management practices are critical to raising productivity and for adding value to the cereal industry. For farmers who have built up a strong business over many years and largely through working on their own, it will be difficult to change the mind-set to sharing power and giving responsibility to others. There is a real worry that farmers will burn out in this new era unless they effectively upskill on good people management skills. The industry must realise that it has to invest in people and realise that this is a long-term project.

"It takes two years to build a farm, it takes ten years to build the capacity in a person to run that farm" – (Interview -Stuart Taylor NZ)

How can cereal farming become the employer-of-choice for the young people through the acquiring of people management skills, which farmers throughout the world regard as necessary? We are world class at cereal farming, why would we not strive to be world class employers and provide world class work places as well?

The role of a cereal farmer has changed over time. The physical work element has fallen significantly on the list of priorities, with farmers now needing to show more leadership and business skills.

"We think we plant crops, no we actually manage people" – (Growers)

To begin, a detailed analysis of the farm system and the people management skills of the farmer is necessary before expansion. All solutions need to be viable and profitable along with providing an attractive lifestyle to all involved. Simplicity is the ultimate sophistication.

Mechanised harvesting need human skill

> "Remember, if an employee fails, or makes a mistake, it is typically the employer's fault. Either the employee was mis-trained or the communication was not clear.

Farmers need to understand the position that needs to be filled to better enable certain skill sets to be targeted and to set clear expectations of the new staff member, therefore, resulting in a clear plan with no grey areas going forward.

Technology is constantly evolving and is replacing much of the world's workforce. It has the ability to make communication much easier and simpler and this can make a farm work more efficient and productive.

Today staff want flexibility; they want routine, rostered time off with a fair and competitive remuneration. They want to be treated with respect, they want to learn, be part of something bigger and all within a positive and progressive atmosphere. Farmers should actively seek to understand an employee's short, medium and long term goals and in turn help their employees achieve these goals through their work. One of the key things to have in mind is that bonuses are only a short term motivator, and operating bonuses will lead to an increased administration burden and become anticipated.

"Paying top salary doesn't automatically attract skilled people who are committed to helping you reach your farm business objectives

While staff turnover is inevitable, the ability to retain staff is one of the most underrated attributes of many successful businesses. Retaining quality people is about ensuring good employees stay in your business because they have interesting and rewarding jobs. It costs

double a person's salary to replace a member of staff therefore it is cheaper to invest in good people rather than replace.

Consistently underperforming or incompetent employees need to be removed immediately. These 'bad eggs' will have a negative impact on the culture and on staff morale. Farmers will need to know when an employee needs support to help them improve their performance, and when that employee needs to be dismissed. This requires leadership and a good understanding of people

"Employers are required to look after employee's health and safety on farm. Keep them safe from hazards, provide the necessary personal protective equipment and watch out for their mental health.

Conclusions

Technical ability and hard work will not be enough going forward to manage the modern farm. Good people management skills and leadership will be.

Cereal farmers have the ability to be the employers-of-choice for many, by providing the best working environments. This is dependent on whether they can get the training and education to develop their people management skills. In this way they can provide the leadership and the management skills that are needed to make farming more attractive to young people.

Clear, concise and continuous communication is key to successful management and achieving 'Buy in' from an employee. Farmers need to have a vision; they need to know what type of culture they want to create on their farm. Farmers need to understand their business goals to ensure they hire the right employees. Farmers need to set out work expectations, provide timely feedback and performance reviews and say 'please and thank you'. This is essential if the industry is to take advantage of opportunities in the sector in the coming years.

View staff as an investment not as a cost to the business. For any business to successfully grow, people need to be the number one goal. Employers must stop giving lip service to the importance of employees within their business and put their words into actions.

Draw up specimen contract agreements, outlining the terms and conditions of employment.

Provide a framework within which employers and employee representatives can come together voluntarily and negotiate terms and conditions of workers in their respective sector. Pay rates, working hours and time off all need to be discussed openly and included in these discussions.

Learn farmers best practice through open days and discussion groups.

Provide a course in good practice in Human Resources so that employers can up skill.

As part of their in-service training days, supervisors need to be trained to identify staff issues, to critically examine employers own people management skills on farms and how to provide advice to both employers and employees to resolve any issues that may arise.

Farmers require an accessible online resource where all relevant tools and information to help them attract, retain, manage, and motivate staff are provided.

Suppliers and manufacturers need to work with farmers and provide them with Standard Operating Procedures relevant to their products or equipment.

Embrace technology. Platforms such as cloud based programs are an innovative way to share farm information such as farm maps and data between a farm team. Use a group messaging app to keep everyone on farm up-to-date with what is happening on farm.

Employers are required to look after employee's health and safety on farm. Keep them safe from hazards, provide the necessary personal protective equipment and watch out for their mental health.

Today's generation is much more interested in a work-life balance than previous generations and expect good terms of employment. Therefore, working hours, time off, rosters, and remuneration are all very important to today's work force in agriculture.

Employers need to protect their reputation to safeguard their business.

Look for attitude and honesty in employees, all other skills can be taught.

The ability to retain staff is one of the most underrated attributes of businesses. The cost of replacing staff can be up to twice their salary. Staffs are an investment in the business not a cost. Constantly train and up skill employees. It shows them they are valued but it also has a positive financial benefit to the farm.

Farmers need to manage their employees better, and if they do so, then their farms will be more productive and profitable.

The most common transport means in rural

PICTORIAL

Trans Nzoia Governor Mr. Khaemba Plants a Commemoration Tree

Kasim Owino, Managing Director Seed Co. (K) Ltd

Ms. Wambua County Agricultural Official Adressing the Crowd

Signing in of Guests

Unveiled : Now officially opened

Processed and Packed Seeds

Displays by Seedco Team

Part of Seedco Team Present

Seedco Launches Kiminini Plant

It was pomp and dance to cereal growers as Mr. Andrew Khaemba, Governor Trans Nzoia County stepped forward to declare the new state the art seed processing facility officially opened and welcome the entry of a new processing plant. “From today, farmers have many options to choose from including quality African Seed Company (Seedco Ltd) varieties as they prepare their seed procurement programs, he said. Adding, “this must be a dream come true for not only farmers but also the county, which is calling on more investors to invest in the area”. This must also have been the realization of those who attended the opening of the new ultra modern state of the art facility at Kiminini, Kitale in Uasin Gishu County.

The launch came with an almost audio-recorded oratory of Mr. Kassim Juma, not previously heard in the region. Speaking during the launch, Mr. Kassim said, “the state of the art facility on the outskirts of Kiminini town is alive with new developments in agriculture. The space is home to Agri-Seed Company (Seedco Ltd), a company that created seed techniques that promises to deliver a beautiful bumper harvest and lead in the front to deliver Kenya from food insufficiency to food surplus”.

The fully equipped and automated production unit aims to grow and deliver a steady, year-round supply of seeds. The Company also aims to package the know-how and cloud services resulting from this business and deploy them throughout the region.

Why Trans Nzoia

Seedco opening of the second seed processing plant is part of its plans to increase sales on the region within the next few years. The growth plan is based on two-pronged strategy that centres around offering technical support and experience to farmers and other agricultural professionals locally.

In Trans Nzoia, there are some professional growers with large operations and state-of-the art agronomic expertise as well as many small and mid-sized farmers working hard to move beyond subsistence farming,” Said Mr. Owino. Adding, “We need to work locally to serve both of these groups with tailored products and agronomic services. That’s why we are building up local sales teams that can offer agronomic support tailored to their markets.” This will be a change, but Seedco is convinced that it is worth the effort.

Welcome to Trans Nzoia County

Promoting sustainable agriculture through local services
Large farming operations will profit from Seedco’s portfolio on modern as well as its regional network of experts who understand the requirements of authorities and consumers in regional markets.

Smallholder farmers looking to sell part of their surplus harvest, on the other hand, are eager to improve their farming practice and adopt modern technologies. To support these growers, Seedco will provide agronomic advice and services as well as growing training. “By putting growers and their needs at the center of all activities, we will be able to grow with our customers in Trans Nzoia. “As we have demonstrated in the past, farmers are highly motivated when they see the benefits of modern crop technology as part of an overall farm management system increasing their income and contributing to their health and prosperity

In Trans Nzoia Seedco will focus on the highland markets and produce seeds for the environment which ensure their requirements are well taken care of. As part of its growth strategy for the region, the company plans to extend and enhance its service to additional countries and farmers across in Uganda, Rwanda and Southern Sudan.

Seedco’s lauch was preceeded by branding of walls in the shopping centres. This has made their presence felt in the region. Other than provision of seeds, Seedco has also provided employment to locals in the processing unit and farmers who are growing seeds for them.

Sustainable Mechanization

Access to farm machinery is key for agricultural productivity and rural livelihoods

Feeding the burgeoning world population will require significant improvements in agricultural productivity, above all in Africa, and mechanization and appropriate mechanization strategies have a large role to play.

The opportunity must be guided in a way that meets smallholder farmers' needs and that does not require a Green-Revolution type of approach with high levels of agrochemical inputs and destructive ploughing operations that threaten soil health and fertility.

Agricultural mechanization: A key input for sub-Saharan African smallholders underlines that agricultural mechanization in the twenty-first century should be environmentally compatible, economically viable, affordable, adapted to local conditions and, in view of current developments in weather patterns, climate-smart.

Mechanization covers all levels of farming and processing technologies, from simple and basic hand tools to more sophisticated and motorized equipment. It extends far beyond ploughing and can contribute to productivity gains and new jobs in the post-harvest, processing and marketing stages of local and global food systems.

As things stand, two-thirds of the power used to prepare sub-Saharan African land for farming is provided by human muscle. Comparable rates are 30 percent for South Asia and even lower for Latin America.

"There is no doubt that the application of farm power to appropriate tools, implements and machines is an essential agricultural input in sub-Saharan Africa with the potential to transform the lives and economies of millions of rural families.

Agricultural mechanization in its broadest sense can contribute significantly to the sustainable development of food systems globally, as it has the potential to render post-harvest, processing and marketing activities and functions more efficient, effective and environmentally friendly.
FAO emphasizes that harvesting the fruit of productivity-boosting mechanization in sub-Saharan Africa depends on making available and accessible appropriate means of farm power supply. This ranges from draught animals to two-wheel and four-wheel tractors. There is a wide variety of agricultural equipment for precision seeding with minimum soil disturbance, efficient planting and transplanting of seedlings, application of inputs, harvesting and transport, processing and value addition that cover the mechanization spectrum. It is therefore important to assure adequate land tenure and credit systems to encourage investments in mechanization.

Sustainable crop production intensification includes soil protection, ample cover crops and minimal tillage - all key principles of FAO's ecosystem-based "Save and Grow" paradigm and directly supporting the 2030 Sustainable Development Agenda, especially SDG2 to "End hunger, achieve food security and improved nutrition and promote sustainable agriculture".

The benefits of mechanization in Africa

Mechanization allows smallholders both to intensify and expand agricultural production as well as enabling some family members to seek off-farm jobs and incomes.

As rural African youths increasingly migrate to urban centres, the region may face labour shortages along with increasing demand for food to be sent to the cities. Mechanization can help the often elderly or female farmers who remain in rural areas to keep up with higher output needs, thus contributing to increased food security and climate change mitigation.

It can be achieved when well-managed private sector mechanization service centres are installed and services are within reach. Interventions from the public sector to help this process include providing specific incentives depending on the mechanization power source and user type. It allows for new and often better jobs in the servicing sector, such as for skilled machinery managers, repair service providers, mechanics, dealers and spare part supply centres.

Future prospects

The goal is to reverse a vicious cycle in which low farmer income leads to low potential for investments in seed, fertilizers and appropriate machinery, leading to low yields and even lower income.

Successfully inverting the trend can improve farm family welfare and also facilitate a response to the paradox that low demand for tractors also hinders the availability of spare parts and even fuel, reducing the value of investing in mechanization anyway. That shift must be driven by the demand of farmers.

Many past initiatives have failed, with subsidized or donated machinery ending up as "orphans" due to the absence of spare parts or repair services. Many countries today have graveyards full of tractors and their associated equipment that seemed cheap at the outset but ended up being very expensive. Funding sustainable mechanization is a challenge. While much modern agricultural technology today is too sophisticated to be suitable for African smallholders, options are proliferating.

The report notes that major international suppliers of farm machinery now produce cheaper and more suitable equipment in developing countries, while there are also a number of evolving agricultural machinery companies from focusing on technology transfer in the interests of smallholder farmers.

Cooperatives have been successful in furnishing members with mechanization services with positive economic and social returns as well as broad and active participation. Elsewhere, individuals have created enterprises buying and leasing equipment to other smallholders.

Two-wheel single-cylinder diesel tractors can be adapted to power well pumps, river boats, threshers, mills as well as producing crops. Farmers with access to appropriate use of such smaller-horsepower tractors can operate them with planters that deposit seeds directly into the soil with minimal disturbance, in line with zero tillage or conservation agriculture regimes.

Federation Calls for Increased Partnership in Climate Change Adaptation

By Moses Wasamu

A regional farmers' federation has called for increased partnership between governments in East Africa and the private sector in implementing climate change adaptation strategies.

The Eastern Africa Farmers Federation (EAFF) further says that stakeholders should seek for opportunities to scale up work on 'Climate Smart Agriculture' (CSA), including access to more technologies and information.

According to the World Food Organisation (WFO), Climate-Smart Agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate.

It aims to sustainably increase agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible.

Stephen Muchiri, the CEO of EAFF said that the federation is seeking support to participate and build more institutional and policy capacity to engage in climate change programmes at all levels.

He urged stakeholders to embrace Information and Communication Technology (ICT) in agriculture to help generate necessary data to support climate change adaptation. He said this during the 2016 Seed Trade Association of Kenya (STAK) Congress and Expo held in Nairobi.
He mentioned that some of the challenges experienced in climate change in the region are reduced rain and prolonged drought, which led to increased incidents of crop failure in 2015/16; shifting of pests and diseases to new areas, leading to increased incidences of livestock diseases, thus affecting household incomes; higher incidence of crop pests and diseases; and changing cropping/rain cycles and farming season.

Other effects of climate change are drying of forest vegetation, leading to lack of food for bees, leading to poor pollination and thus low productivity. He says that climate change has also led to heavy but short sporadic rainfalls, resulting in insufficient rains for growing of crops. Climate change has also led to landslides.

The federation has been in existence since 2011. Its vision is to have a prosperous and cohesive farming community in East Africa. It draws its membership from producer co-operatives, commodity associations, women organizations and lobby and advocacy groups.

The EAFF promotes 'Climate Smart Agricultural' practices and trains farmers on interpreting climate maps, using its approach of downscaling of seasonal forecasts to specific locations, which increases accuracy.

The federation has organised exchange and learning visits among EAFF members in the region, where they have learned about how small-holders have diversified operations into different enterprises that are more suitable for unpredictable weather conditions, hence offering some cushion from weather related risks.

It has been involved in policy work on climate change, with the most recent one being the national climate change policy meeting that involved members from the Democratic Republic of Congo, Rwanda, Kenya and Uganda.

Farmers Urged to Consider Insurance as Mitigation Against Climate Change

By Moses Wasamu

Farmers in East Africa now have more crop insurance options to help cover them when they are affected by adverse effects of climate change.

This was revealed by Rahab Kariuki, the chief executive officer of Acre Africa, a micro-insurance product designer linking farmers to agricultural insurance through localized solutions to reduce climate risks. She was speaking exclusively to Cereals Magazine in Nairobi.

"Agriculture insurance is not a far-fetched concept since food security depends on seed security and the international seed industry must be able to continue to deliver the quantities of quality seed required for this purpose," she said.

She added that abiotic stress resulting from climate change, particularly elevated temperature and water stress, will reduce seed yield and quality. These are some of the challenges facing farmers and which they need to take precaution on by way of insurance cover.

> "Acre Africa helps to provide insurance across the value chain, right from inputs, production, storage, processing and manufacturing, to retail.

Acre Africa is a licensed insurance intermediary, supporting local insurers to offer smallholder-focused insurance across value chains. It has offices in Kenya, Rwanda and Tanzania.

Ms. Kariuki suggested that moving sites for seed production, changing sowing dates, and development of resistant cultivars are some of strategies farmers can adopt in order to deal with the challenges of climate change.

Acre Africa helps to provide insurance across the value chain, right from inputs, production, storage, processing and manufacturing, to retail.

One of the products that Acre Africa offers is a 'Full Season Cover' for seed growers, which allows farmers to replant and harvest the same season, in case of germination failure after 21 days without rain.

This is how it works. At the beginning of the planting season, the farmer purchases an insured bag of seeds, in which there is a card. The card has a unique code which the farmer then sends by short text message to the insurer.

This enables the insurance provider to get the farmer's location from a location-based service system, which is able to locate the farmer's phone, and monitors satellite imagery for that location.

In the case of germination failure after 21 days, if there is no rainfall in his or her location, compensation money is sent to the farmer via mobile phone. This arrangement ensures that the farmer can replant and harvest during the same season.

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In your entire life, have you seen a yellow as yellow as this yellow?

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Canola : An Ideal Breakthrough for Growing Your Profitability

"It will reduce weed, pest and disease management expenditures", says Jason Kamunya

During continual monoculture of barley or wheat, yield progressively declines due to a build of weed, pest, and disease problems. Soil health and soil biology also declines which results in nutrient release generated by soil bacteria and fungi being reduced. The residues from your previous crop take a longer time to break down thus providing a greater source of disease carry over and an unhealthy environment for the seed of the next crop.

"One of the compelling answers to this situation is to introduce a broad leaved crop into your crop cycle and thus create a simple rotation. Canola is an ideal break crop", says Jason Kamunya.

Disease clean up: Canola has a totally different disease spectrum and thus breaks the carry over cycle of the barley and wheat crop. When the following cereal crop is grown the fungicides will have a chance to perform better and improve disease control compared to a monoculture situation.

Weeds clean up: A different type of herbicide can be used safely in canola which will control brome grass species {and others like ryegrass and setaria}, which have become a serious weed and very difficult to control within the cereal crop. The selective herbicides available for use in canola will give an excellent control of grass weeds and combined with the massive smothering effect of a good canola, farmers can gradually get on top of their weed problem.

Soil Health: The introduction of rotation into your farm will also provide an improved soil environment and a stimulation of a wider range of beneficial soil bacteria and fungi. The large taproot generated by the crop will help open cracks in the soil for improved drainage and deeper root growth?

Financial Gains: The introduction of canola, say on a 3year cycle initially, will lead to improved net income and profitability over the period.

Seeds: The two main varieties available are Belinda {Bayer East Africa Ltd} and TT Hyola {Kenya Highlands Seeds} alternately, Agventure Ltd can provide seed from either of the sources.

Marketing: A contract is provided by Agventure Ltd. For all cooperating growers. It includes the area agreed to be grown, the price calculation applied at the time of selling your grain to Agventure Ltd; and payment terms in addition to all other standard conditions.

Unilever, Agventure and SNV sign unique agreement

Kenyan farmers adopt conservation agriculture to double canola production in 2017.

Unilever East Africa, Agventure Ltd and SNV Netherlands Development Organization have today signed a memorandum of agreement formalising a venture that aims to double canola oil production in Kenya by the end of 2017 through contract farming arrangements. The agreement involves technical assistance to local farmers and financial investment of 23 million split among the three partners.

Speaking during the MOA signing, Unilever East Africa MD Justine Apsey loaded the partnership sighting that it went hand in hand with Unilever's sustainability commitment towards reducing environmental impact and improving local farmer livelihoods.

"Sustainable farming methods have the portential to increase yields considerably, mitigate the effects of climate change and provide economic and social benefits to farmers, their families, and the surrounding communities. Participating local farmers will benefit from and contribute to economic development and sustainable farming practices in Kenya".

Unilever purchases around 2% of the world's supply of sunflower and canola oils, touted as one of the healthiest edible oils and the 7000MT peak demand in Kenya is a perfect trigger to establish sustainable local sourcing model.

On its part SNV, through a program dubbed HortIMPACT, combines the expertise of the private sector with market best solutions to build sustainable and competitive agriculture markets in Kenya. As part of the agreements, SNV will work with Agventure Ltd, a local cooperative of large enterprise farmers that started growing canola and producing canola oil since 2010.

Ambassador Frans Makken of the Kingdom of Netherland was present during the signing. The Dutch Embassy is funding SNVs five year HortIMPACT program and considers the agreement an excellent example of the combination trade and development cooperation which forms the core of the Dutch Development Cooperation Policy.

The agreement foresees that a total of 500 local farmers will be trained resulting in doubling the annual supply of locally sourced canola oil for Unilever to atleast 3000MT by the end of 2017.

Tom Derksen, MD Agriculture and Energy at SNV said; " This business case is the start of a wider conservation agriculture revolution for farmers. It is an excellent example of how SNV works at the producer level, the company supply chain level and across the wider land scape to deliver lively hood benefits for the poor and sustainable development at scale. It shows agriculture can in fact become more climate resilient and at the same time boost local farmers profits".

Agriculture Needs New partnership structure to fulfill its socio-economic potential, says expert

By Moses Wasamu

The challenges to achieving global food security are enormous. Experts say that at least 900 million people do not get enough food to eat, global population is expected to increase by 2 billion by 2050 and scientists are battling the threat of climate change, which causes erratic weather patterns and global warming.

And all these factors, plus many others, affects the income of farmers and peoples livelihoods.

Gagan Khurana, co-founder at Maxiterra, an agricultural innovation and technology organisation, says that because of rapid development in agriculture planning, solutions which have worked before may not be relevant any more. Therefore, he proposes new partnership structures that will enable agriculture to improve and fulfill its social and economic potential.

In a presentation made in Mexico to mark 50 years of International Maize and Wheat Improvement Center (CIMMYT) work in the world, Gagan said that significant issues exist at every stage of the value chain which hinder progress. Gagan says that subsistence farmers (smallholders) are stuck in a poverty trap preventing them from improving their livelihood.

An analysis of the situation shows that smallholder farmers fall outside the formal supply chain. He adds that it is possible to break this vicious cycle of poverty without subsidies and donor grants, through innovations in the existing supply chain structure.

Whereas cooperatives societies, which are common in most developing economies, have tried to achieve increased incomes for farmers, they have not succeeded in most cases because of lack of capability in managing all aspects of the value chain on a commercial basis, limited education levels which do not allow farmers to develop commercial and business skills, and dependence on government subsidies and political interference.

To reverse the situation, Gagan says, there is need to restructure the value chain in order for the small holder to take a larger part of the profit margin, build small holder capabilities in order to increase the size of the profit margin through better yields and higher quality products, and to involve all stakeholders (government, private companies, NGOs) to identify and address critical non-agriculture related enablers and blockers to smallholder success.

Fortunately, he says, governments, global organizations and farmers are already collaborating with each other to help improve existing agriculture and supply chains through public Private Partnerships (PPPs). He points out that these public and private sector engagements have been the missing link in the agricultural value chain.

Agriculture stakeholders should change their business-as-usual approach

For these changes to happen, he says, agriculture sector companies and other stakeholders will need to change their business-as-usual approach, in order to take advantages of reduced costs per unit sold due to sharing of distribution channels, and creation of more robust value chains due to increased interaction and integration between the players along the value chains.

Since agriculture supply chains in most emerging markets are not efficient, he says one way to go around this would be to make the value pool distribution more efficient through improved information flows backed by alternate access channels that allow the farmers to earn more money without necessarily increasing factory-gate prices.

This can happen by way of the PPPs creating an innovative field model to achieve inclusive growth. He proposes a Special Purpose Entity (SPE) to create and manage integrated value-chains. The purpose of the SPE would be to coordinate the work and output of several actors and companies in the value chain. These actors include input suppliers and distributers, farmers, aggregators, consolidators, the broader market and buyers.

The proposed SPE ownership structure should include farmers, companies and NGOs initially, with farmer associations increasing their stake over a period of time. Gagan says that to make this work, there is a critical need to create practical structures which allow complex PPP arrangements to efficiently and quickly implement projects on the ground.

Other necessary interventions he mentions are in the area of research and development, input distribution and adoption, farming, trading and

"It is possible to break this vicious cycle of poverty without subsidies and donor grants, through innovations in the existing supply chain structure.

processing, and in manufacturing and retailing. Cross-cutting issues that can also be addressed include policy environment, infrastructure and market linkages.

Positive results as a result of interventions in Africa Gagan said that a better understanding is required of the optimal tradeoffs between different stakeholder needs and the results that can be achieved. He says that in some countries like Rwanda, Morocco and Ghana, some positive results have been achieved as a result of putting in place some interventions.

Gagan, an expert on agriculture and water, says these interventions have seen maize yields increased two-fold, and agriculture GDP reached 7% per annum in Rwanda; in Morocco, the smallholder income increased from USD 1,000 to USD 3,000, while in Ghana, it led to the vision to increase rice self-sufficiency from 30% to 70%.

Gagan was one of the main speakers in the conference that brought together over 500 scientists, government officials, farmers and members of the international agriculture for development community in a three-day conference.

According to the organisers, the event was a chance to reflect on the past and discuss how the socio-environmental challenges of the future will affect agriculture research for development, smallholder farmers and crop yields.

Gagan has worked extensively in Asia, Latin America and Africa over the last two decades. His work focuses on agriculture, rural supply chains, sustainable use of water and land, economic issues related to rural development and social programmes.

The CIMMYT works throughout the developing world to improve livelihoods and foster more productive, sustainable maize and wheat farming. It targets critical challenges, including food insecurity and malnutrition, climate change and environmental degradation.

Unlocking the Potential of Agribusiness

After decades of neglect, agriculture is again receiving attention from African governments, investors, and other partners, but their attention should extend to agribusiness. The attention focused on production agriculture will not achieve its developmental goals in isolation from agribusinesses, ranging from small and medium enterprises to multinational companies.

Africa now earns an average of 24 per cent of its annual growth from its farmers and their crops. If matched with more electricity and irrigation, smart business and trade policies and a dynamic private agribusiness sector that works side by side with government to link farmers with consumers in an increasingly urbanized Africa, the World Bank estimates that agriculture and agribusiness together could command a US$ 1 trillion presence in Africa's regional economy by 2030.

This is why we cannot overstate the importance of agriculture to Africa's determination to maintain and boost its high growth rates, create more jobs, significantly reduce poverty, and grow enough cheap, nutritious food to feed its families, export its surplus crops, while safeguarding the continent's environment.

This is a message to share with African governments, the private sector and community leaders on a continent which holds more than half of the world's unused fertile farm land, and impressive but untapped water resources. With global and regional food and agricultural markets growing at unprecedented rates, it is important to understand to unlock and transform agriculture for development and opportunity across Africa.

It is valuable to synthesize the large body of work on agriculture and agribusiness in Africa. It is important to build on a diagnosis of specific value chains, and shows a dynamic agribusiness sector can contribute to growth. The value chain for Africa's largest and fastest growing food imports should be benchmarked with quality field data and analysis spanning the value chain. The private sector dynamism should be unleashed if some of the barriers to investment in Africa—poor infrastructure, fragmented markets, poorly functioning input markets, difficulties accessing land, water and finance, and inadequate skills and technology—are removed.

Unlocking the Potential of Agribusiness opportunity for structural transformation.

Governments and investors must also put in place effective environmental and social safeguards to reduce potential risks of agribusiness investments, especially those associated with large-scale land acquisitions by investors.

Why agribusiness?

Agriculture and agribusiness together are projected to be a US$ 1 trillion industry in Sub-Saharan Africa (SSA) by 2030 (compared to US$ 313 billion in 2010), and they should be at the top of the agenda for economic transformation and development. Agribusiness can play a critical role in jump-starting economic transformation through the development of agro-based industries that bring much-needed jobs and incomes. Successful agribusiness investments in turn stimulate agricultural growth through the provision of new markets and the development of a vibrant input supply sector.

The challenge is thus threefold:

(1) Develop downstream agribusiness activities (such as processing) as well as upstream activities (such as supplying inputs),
(2) Develop commercial agriculture, and
(3) Support and link smallholders and small enterprises to productive value chains.

This evidence demonstrates that good policies, a conducive business environment, and strategic support from governments can help agribusiness reach its potential. Africa is now at a crossroads, from which it can take concrete steps to realize its potential or continue to lose competitiveness—missing a major opportunity for increased growth, employment, and food security.

Government should:

- Synthesize the large body of work on agriculture and agribusiness in Africa.
- Build on a diagnosis of specific value chains.
- Analyze to gain perspective on the elements of success and failure. Synthesizes perspectives from the private sector.
- Lastly offer practical policy advice based on the experience of countries from within and outside Africa. The huge diversity of Africa's agro-ecological, market, and business environments, however, necessarily means that each country (and indeed regions within countries) will need to adapt the broad guidance provided here to the local context.

Agribusiness in Sub-Saharan Africa—A large sector

Agriculture and agribusiness together account for nearly half of GDP in Africa. Agricultural production is the most important sector in most African countries, averaging 24 percent of GDP Agribusiness input supply, processing, marketing, and retailing add about 20 percent of GDP. Global experience suggests that with growing incomes and urbanization driving the commercialization of agriculture, the shares of both downstream and upstream agribusiness activities are poised for rapid growth.

Agricultural value chains are very diverse. Many value chains have dualistic structures serving different markets—an informal sector often serves low-income consumers and a formal sector accommodates high-income consumers and exports. Major opportunities exist to drive agribusiness development by upgrading informal value chains and linking them to formal value chains.

Strong growth opportunities for agribusiness Both domestic and global markets are

experiencing strong demand, which is likely to continue even as domestic demand accelerates.

In the 1980s and early 1990s, when many African countries liberalized their markets, declining world commodity prices negated many of the rewards expected from liberalization. The return to economic growth in Africa since the 1990s, burgeoning urbanization, and buoyant global commodity markets now provide unprecedented market opportunities for Africa to develop a competitive agribusiness sector. Urban food markets are set to increase fourfold to exceed US$ 400 billion by 2030, requiring major agribusiness investments in processing, logistics, market infrastructure, and retail networks.

The growing middle class is also seeking greater diversity and higher quality in its diets. The most dynamic sectors overall are likely to be rice, feed grains, poultry, dairy, vegetable oils, horticulture, and processed foods for import substitution.

Most African countries have a comparative advantage in agriculture. Africa has more than half of the world's agriculturally suitable yet unused land, and its impressive water resources have scarcely been tapped.

Although rapidly growing local and regional markets could be partly and efficiently sourced from imports, Africa's abundant natural resources, large and exploitable yield gaps, and an improving investment climate open major opportunities on the supply side, too.

Private sector interest in African agribusiness is unprecedented. The past decade has witnessed an upsurge in interest from the private sector in African agriculture and agribusiness,including interest from foreign investors and investment funds. International investors actively seek alternative venues to Asia and Latin America as a new source of supply and an opportunity for higher, risk-adjusted returns. The challenge is to harness investors' interest in ways that generate jobs, provide opportunities for smallholders, respect the rights of local communities, and protect the

"With global and regional food and agricultural markets growing at unprecedented rates, it is important to understand to unlock and transform agriculture for development and opportunity across Africa."

environment. Going forward, a key challenge is to curb speculative land investments or acquisitions that take advantage of weak institutions in African countries or disregard principles of responsible agricultural investment.

Agriculture and agribusiness are underperforming

In most African countries, agriculture and agribusiness have been losing in the competitiveness race. Competitiveness as crudely measured by Africa's share of global agricultural exports has fallen for most countries and for many export commodities, even as higher commodity prices have stimulated a commodity boom over the current decade. Many developing countries, such as Brazil, Indonesia, and Thailand, now export more agricultural products than all of Sub-Saharan Africa combined.

While its export shares are falling, Africa's imports of many food products have been rising. Continued growth in domestic demand could increase food imports rapidly, despite the abundance of land and water available for African agriculture.

Poor competitiveness in turn relates to low and stagnant productivity. Even since the start of liberalization in the late1980s, productivity of almost all agricultural subsectors has performed poorly in Africa relative to regions with similar agro-ecological potential. Crop and livestock yields are often half of averages in Asia and Latin America, largely reflecting Africa's very low use of modern inputs such as improved seed, fertilizer, and irrigation water. Africa's agricultural growth derives largely from opening new land to agriculture, with negative consequences for biodiversity, forests and soils.

These adverse trends can be reversed through good policies, sustained public and private investments, and public-private partnerships backed by open, transparent procedures and processes along the entire value chain. Africa already has a number of bright spots of good productivity growth and competitiveness, such as horticulture, tea, and in some cases rice. A number of countries, including Kenya and Cote d'Ivoire and Cameroon, Ethiopia, Ghana, Malawi, and Zambia, have performed relatively well in tapping buoyant markets.

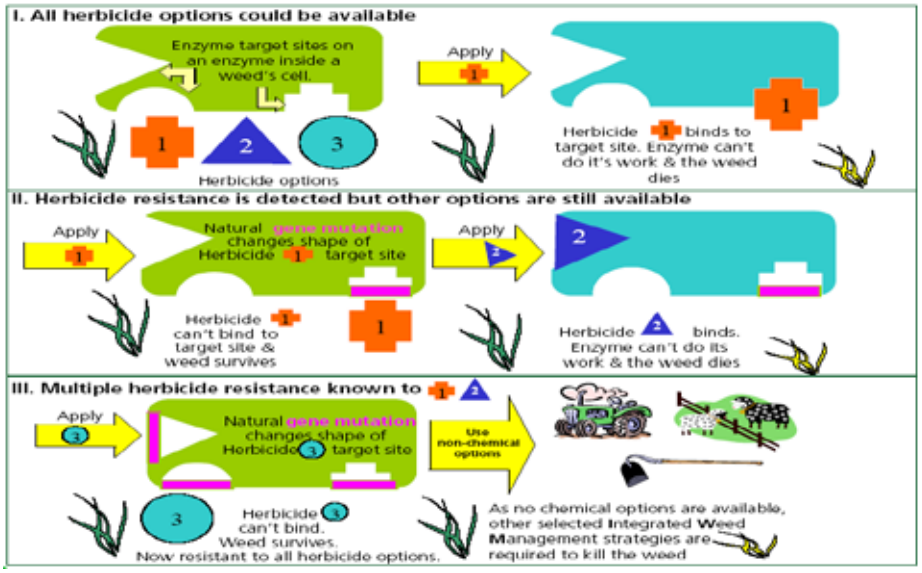
Many constraints are specific to value chains To realize these opportunities, Africa has to overcome a legacy of state intervention in agricultural markets, weak land markets, and the neglect of public investment in agriculture. It must also confront new risks from Growing Africa: Unlocking the Potential of Agribusiness environmental degradation and climate change.

Constraints to the development of agribusiness in Africa have been studied extensively and can be classified into four broad categories:

1. Erratic policies in agricultural output and input markets and trade.
2. Limited access to land and respect for community land rights.
3. Poor infrastructure and high transportation costs
4. Difficulties for smallholders and small firms to access technologies, information, skills, and finance.

These key constraints vary not only by country but by value chain, affect the performance of different types of value chains in selected African countries.

Mode of Action in relation to Resistance Development.



Avoiding Herbicide Resistance in Weeds

A wise farmer once said, "If you do anything the same way long enough, it's wrong, because soon things are going to change"

This is certainly true when speaking of weeds and herbicide resistance.

Just like any other farmer, cereal growers in Narok have their challenges especially on weed control and management. A reoccurring challenge has been on weed resistance.

"One result of modern agriculture and its reliance upon herbicides is the emergence of weed populations that are resistant to herbicides", states Doris Kawira, Amiran's Cereal Manager.

During a dinner hosted by Amiran Kenya and Dow Agro science, large-scale farmers in Narok were taken through a detailed training on how to prevent weed resistance. "We want our farmers to be informed on new farming techniques. To us, this is more than just selling a few bottles of herbicides. Growers need to think ahead, to think smart. We are here to walk with them as they grow their crops", explains Oscar Shilliebo from Dow Agroscience.

Weed Resistance

This is defined as the inherited ability of a weed or crop biotype to survive a herbicide application to which the original population was susceptible.

Factors that influence the Evolution of Resistance

- Using a herbicide with the same mode of action.
- Using the same herbicide multiple times during one growing season.
- Repeated application of a herbicide with the same mode of action.
- Chemical strategy (Herbicide used without other weed control strategies).
- Repeated use of a product for more than 2 years could develop a herbicide resistance challenge.
- Use of lower application rates
- A monoculture of continues wheat/maize production
- Weeds that produce lots of seeds with little dormancy and short longevity
- A herbicide that has a high efficacy on a specific weed species
- A herbicide with prolonged residual activity
- Use of lower that recommended rates

In a discussion with the farmers, Oscar explained that avoiding herbicide resistance is the preferred route for this problem. However, if herbicide resistance has already arrived, recognizing and properly managing herbicide resistance can save some tremendous weed headaches.

Here are some recommended solutions for farmers:

1. Prevention is better than cure- Don't wait for herbicide resistance to occur.
2. Map out resistant weeds in your farm
3. Focus on a spray regime to take out resistant phenotypes
4. Observe application timing and rates as recommended on the label
5. Chemical Mode of Action rotation
6. Split application of herbicides for BLWs and grasses
7. If herbicide resistance is suspected get expert help immediately

A drive around the farms in Narok County not only links one to nature as you enjoy the green serenity but also makes one appreciate the effort and handwork of the maize and wheat farmers in the area. Farming is taken very seriously in Narok County by both small and large scale growers. During the growing season the county is busy with activity; planting, crop nutrition and protection spraying, harvesting, sorting, the list is endless.


Amaranthus Weed

Partnerships that bring together like-minded organizations such as Dow and Amiran have the farmer at heart, as their experts spend their days researching, conducting trials and coming up with modern farming practices that are ideal for cereal farmers, all with the end goal of ensuring farmers have an easier time at the farm and a smiling face when cashing in their returns.

PICTORIAL

Doris addressing farmers

Oscar showing growers product catalogue

Farmers keenly following the presentations

Part of the farmers present

Oscar and Doris listening to farmers contribution

Heartfelt discussion between farmers

Dinner time for farmers

CEREAL FARMERS IN KENYA

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

CEREAL FARMERS IN KENYA

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

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 patient say they were Run, Belt and Radiated.

The first attack, 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, Dow Agrosciences recommended a rate of 500 mls per Ha or 50ml/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 WMD 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.

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 and broad spectrum control. 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. Farmers were advised to use a rate of 200ml/Ha or 20ml/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, my beloved readers 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 vegetative 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 dug 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. So please do not smear my vacation with cow dung", I summed

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