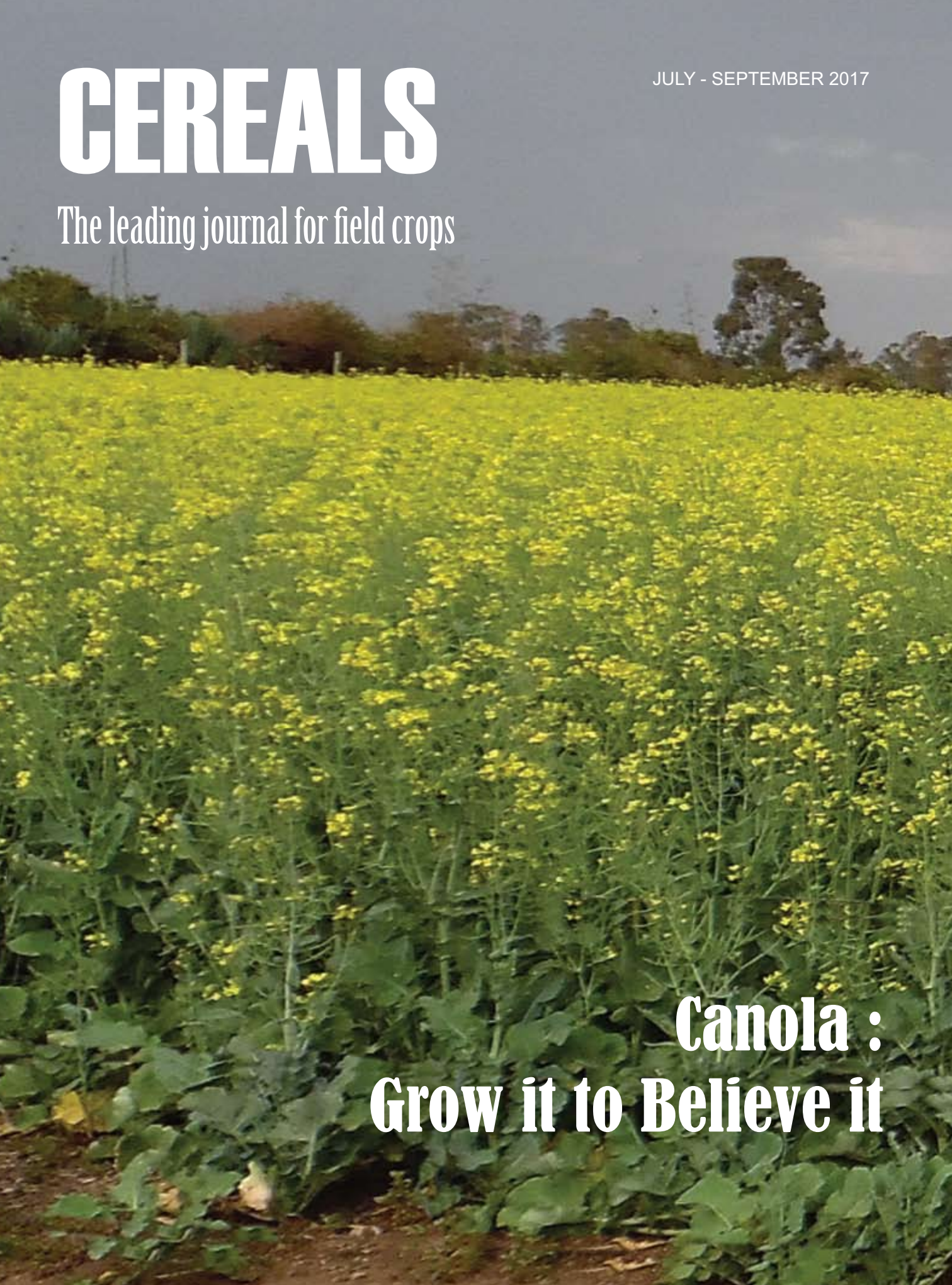
JULY - SEPTEMBER 2017

CEREALS

The leading journal for field crops



Canola : Grow it to Believe it

ELGON KENYA

Recommended insecticides for management of Fall Armyworm by the Ministry of Agriculture, Livestock & Fisheries

ANGAMIZA FALL ARMYWORM

Pest Damage

A

Coragen 20SC

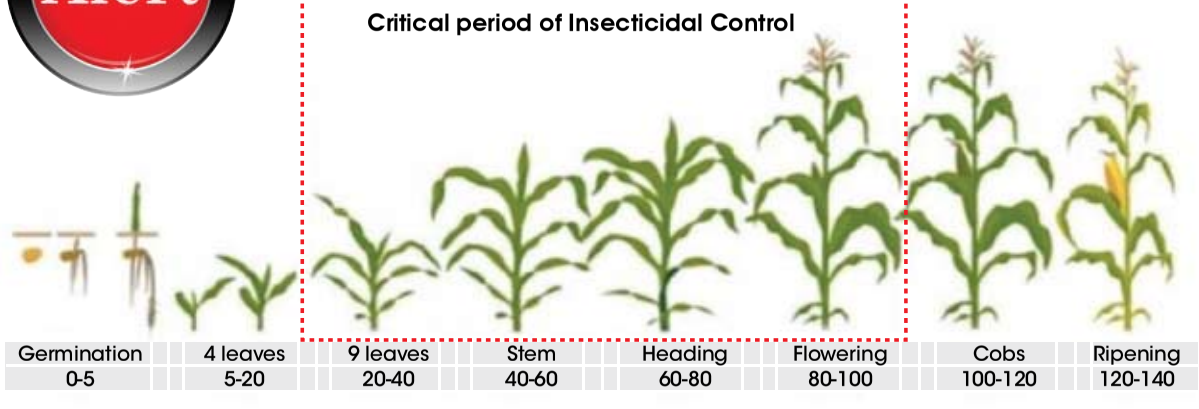
200ml / Ha, 6-7ml/20l

B

Avaunt 150 EC

300ml / Ha, 7-8ml/20l

Alternate between A, B, C or D to prevent pest resistance



Spray late evening when Fall Armyworms are most active, about 2 weeks after emergency and just before tasseling.

C

Fastac10 EC

500ml / Ha, 40ml/20l

D

Vantex 60CS

200ml / Ha, 5-6ml/20l

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One Community

We Link Growers, Crop input suppliers and Crop Consumers. That will never change, even if times chane.

For a start, am still panicking. The Fall Army Worm is still causing havoc to our crops. Going by what the national and county governments are doing; we are not controlling this pest anytime soon. In this issue, I try to compare our actions and other countries. It is a pity.

Cereals Magazine best represents the evolution of our business and yours (Argipreneurs). The crop input value is more integrates than ever, especially on application side. Consumers need trusted sources than . Nutrition is now more important than before. That is why in this issue i have gone a step further to look at on of the safest source of oil; Canola. If you are not planting it OR using its oil, then this is your issue

We have been covering progression in food safety. In this issue we will take you through the Hermetic Storage Technology. This technology preserves dried cereals without use of any pesticides dust.

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Masila Kanyingi
Editor

Cereals **EDITOR:** Masila Kanyingi **EDITORIAL ASSISTANT:** Cornelius Mueke **CONTRIBUTORS:**Thomas Kipkorir, CIMMYT, SNV Neil Mitchelmore, David Jones, Ministry of Agriculture, Doris Kawira, Nelson Maina, John Rampton **PHOTOGRAPHER:** Jairus Ndani, **GRAPHICS DESIGNER:** Evelyne Ndiema **MARKETING:** Wilbur Njemah, Elly Okutoyi

EDITORIAL BOARD: Thomas Kipkorir - BASF E.A Ltd, Agnes Gitonga - Sygenta E.A Ltd., Doris Kawira - Amiran (K) Ltd., Steve Ogolla - Elgon Kenya Ltd. Joseph Kioko - Agribase Bioscience Int. Ltd., Patrick Gachanja - Bayer East Africa, Martin Mwobobia - ETG,

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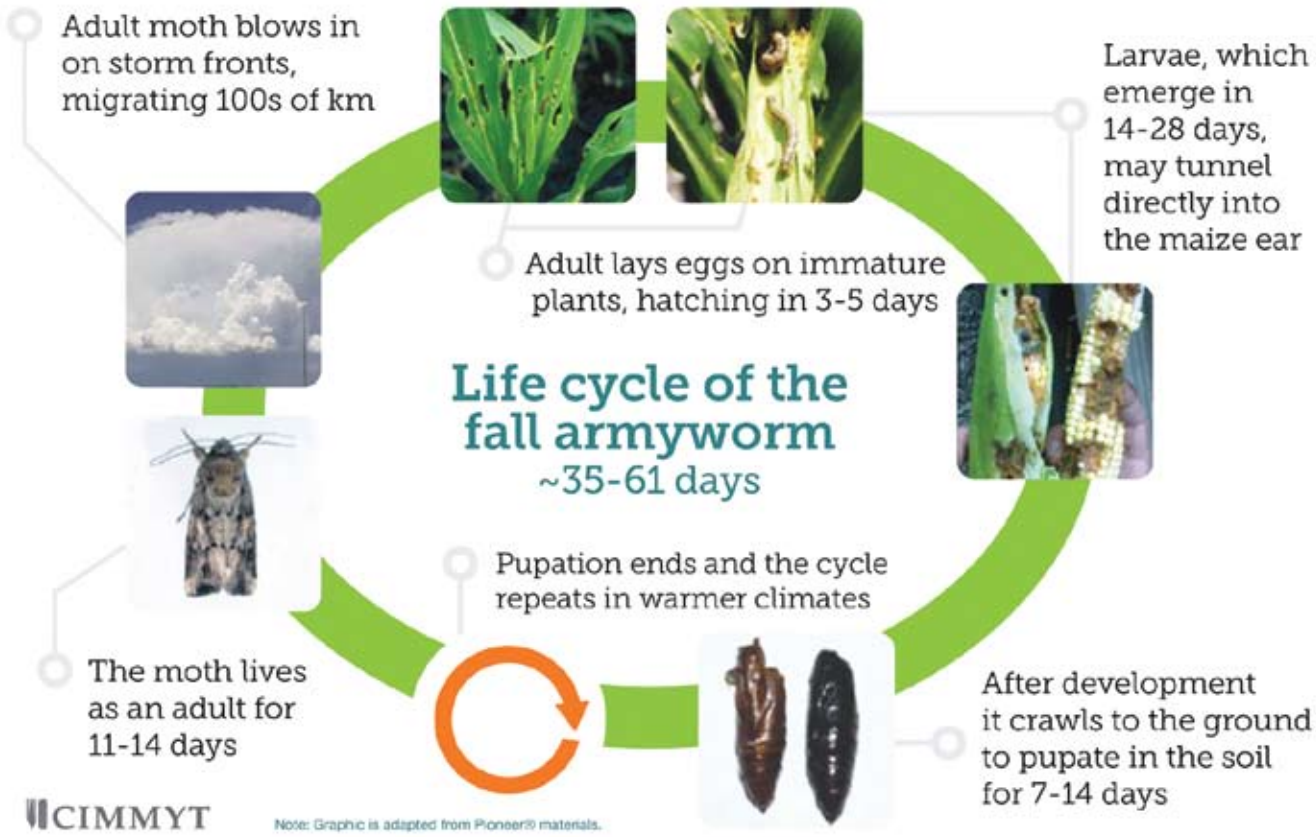
Multi-pronged Approach Key for Effectively

The truly frightening risk of the fall armyworm to food security in Africa must be recognized and tackled with a holistic integrated pest management program.



Some ideas for building resilience and combatting the fall armyworm:

- Combination of cultural, biological and bio pesticide control
- Develop host plant resistance (conventional and transgenic)
- Low-cost chemicals, protective clothing, spraying equipment
- Heat, drought, pest resistant hybrid crops
- Heat, drought, pest resistant genetically modified crops
- Identification of predatory insects
- Pheromone traps to lure moths to target and destroy eggs and larvae
- Use of bio pesticides for natural distribution by birds or other animals
- Tool allowing farmer to pluck pest larvae out of plants
- Build a strong communications network about the pest

Defeating Fall Armyworm in Africa

Tackling the menace of the tenacious fall armyworm pest to avoid economic hardship for smallholder farmers across Africa requires quick and coordinated action, a massive awareness campaign, scientific innovation and multi-institutional collaboration, said scientists attending the Stakeholders Consultation Meeting on the Fall Armyworm in Nairobi.

The fall armyworm, a recent interloper in Africa widely prevalent in the Americas, attacks more than 80 different plant species, including maize, a major food staple in sub-Saharan Africa on which more than 200 million people depend.

"The truly frightening risk of the fall armyworm to food security in Africa must be recognized and tackled with a holistic integrated pest management program," said B.M. Prasanna, director of the Global Maize Program at the International Maize and Wheat Improvement Center (CIMMYT) and the CGIAR Research Program on Maize. "We cannot eliminate the pest from Africa – now that it's here, it will stay, but we can provide support to farmers and provide options to manage their crops against the fall armyworm."

The female fall armyworm can lay up to 1,000 eggs at a time and can produce multiple generations very quickly without pause in tropical environments.

A conservative estimate indicates the loss of Africa's maize due to the fall armyworm could cost the continent $3 billion in the coming year, according to Roger Day, sanitary and phytosanitary coordinator at the Center for Agricultural and Biosciences International (CABI).

The fall armyworm has been reported in all countries in southern Africa except Lesotho and the island states; plus most countries in eastern Africa, including Kenya, Tanzania, Uganda, Rwanda, Ethiopia and Burundi. It

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Farmers Search for Answers as Armyworms Move Across Africa

Pests known as fall armyworms are destroying crops in.The fall armyworm is an invasive species that is native to North and South America, said Sina Luchen, regional agronomist for the Food and Agriculture Organization of the United Nations (FAO) in Johannesburg, South Africa. These types of shocks normally affect the poorest people, the most vulnerable farmers, and in Kenya up to 70 percent of the people derive their food security and livelihoods from agriculture.

Africa has its own species of armyworm, but Luchen said that the fall armyworm has been more harmful because farmers were not aware of the pest and may have been slow in reporting it to authorities. The fall armyworms destroy maize crops before turning into moths to travel to their next destination. To date, they have destroyed millions of hectares of maize, according to the International Maize and Wheat Improvement Center in Mexico.

Zambia, Malawi and Zimbabwe are urging farmers to act fast with pesticides to halt the spread of armyworms now threatening crops. Armyworms are a common pest, but this year's invasion has sparked particular concern. In those three countries alone, the worms have destroyed thousands of hectares of maize — a staple food. El Nino-induced drought and flooding destroyed much of the previous two harvests, leaving nearly 30 million people in the region in need of food assistance.

"The problem is that if you have had, like we have had in southern Africa, two droughts, it provides [a] conducive environment for the army worms to be very active when the rains come," said Chimimba David Phiri, coordinator for the U.N. Food and Agriculture Organization for Southern Africa. Malawi first reported the armyworms at the start of January, in eight of the country's 28 districts. Now, officials say the worms have spread across Malawi.

"People in most parts of the country are now reporting incidents of some sort," said Erica Maganga, principal secretary in the Ministry of Agriculture in Malawi. She says efforts are underway to contain the worms. "It's a pest that comes almost in every growing season," Maganga said, "so we always pre-position pesticides in all the ADDs [Agriculture Development Divisions]. We are giving out cypermethrin to small-scale farmers whose gardens have been affected." Maganga says owners of big farms are advised to buy the pesticides from agro-dealer shops.

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has also been reported in several countries in West and Central Africa, including Nigeria, Ghana, Benin, Togo, Democratic Republic of Congo and the island nation of Sao Tome Principe.

"We just don't know how far this could go," said Joe DeVries, vice president, program development and innovation at the Alliance for a Green Revolution in Africa (AGRA). "Fall Armyworm is a very recently-introduced pest in Africa and even the experts are unsure what its long-term impact will be. We agreed on the urgency of enabling national plant protection groups to work with farmers in controlling the level of damage on their farms. Longer-term, though, only a truly collaborative effort between international and national agencies can provide a solution."

Integrated Management

"The first step to an effective integrated pest management strategy is to survey and monitor pest movements, assess yield loss levels and to compile data using remote sensing equipment and at the field level," said Gabriel Rugalema, the U.N. Food and Agriculture Organization (FAO) country representative for Kenya. "Accumulated data can contribute to establishing uniform cross-continent government standards for identifying and fighting the pest."

"We need to act fast, failure is not an option," Rugalema said, adding that adequate funding and taking a regional approach to controlling the fall armyworm are vital.

Brazil Spent $600 Million on Fall Army Worms.

FAO's Luchen said pesticides are also costly. For instance, he said, Brazil has spent up to $600 million per year to manage the armyworm. These farmers do so by applying two sprayings per week while the crop is growing, a costly process that may not be affordable for African farmers.

"That is an intense use of pesticides," Luchen said. "Our farmers in Africa cannot afford the costs of such use of pesticides." Luchen said the FAO is hoping to teach a more low-cost and eco-friendly approach to combating the fall armyworm.

"What we are advocating for is the use of an integrated approach which looks at not only chemical applications, but also looks at biocontrol. It looks at the use of surveillance systems in order to have early detections to ensure that when interventions are necessary, it will be effective, because this pest is quite tenacious," he said.

Future Challenge

Scientists believe that the fall armyworm may have spread and proliferated on the continent due to warmer global temperatures over the past few years. They suspect the pests may have travelled from the Americas in warm ocean jet streams or arrived by some other form of transportation.

Scientists fear the fall armyworm could continue to multiply and become endemic across the continent. Professor Kenneth Wilson at Britain's Lancaster University, who

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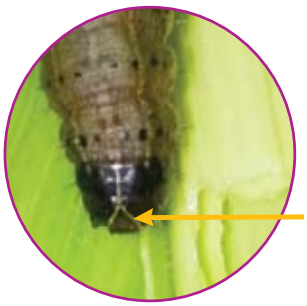
Rwanda uses Military to Airlift in fighting Fall Army Worms

In neighboring Rwanda, the military has joined the fight by airlifting pesticides to affected regions and spraying the crops. The pests are difficult to eradicate since they have a short life cycle and procreate in abundance. During a two-week life cycle, a moth will lay up to 2,000 eggs, typically on young maize plants. When the larvae hatch, they burrow into the plant and destroy it.

"We, frankly, had no solution," said a Rwandan farmer. "We would spray the crops today, but they would resurface the next day. Now that we have pesticides, I believe this will work, although we would've preferred to have the pesticides a little early. It would have made a difference."

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

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500ml/Ha

or

Match®
600ml/Ha

VoliamTargo® and Match® should be alternated for best results

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has extensive experience working on the African Armyworm, predicts the pest could potentially spread into the Middle East and eventually to Europe. The moth has been known to fly distances of up to 1,600 kilometers (1,000 miles) in 30 hours, according to experts.

Learning From Brazil

Scientists noted that Brazil, a tropical country that has also battled the FAW could be a useful benchmark for understanding how to manage the pest in Africa, which typically does not have the natural control measure of freezing temperatures.

"We need to develop and deploy in a fast-track manner improved drought tolerant, disease resistant hybrids adapted to Africa that are also resistant to the fall armyworm," Prasanna said. "This is possible in the medium-term of five to six years, while other effective integrated pest management options are scaled-up and delivered to the farming communities."

Build Resilience

Despite the challenges, we are continuing to build resilience, increase agricultural productivity and regional coordination on agriculture, said Candace Buzzard, deputy mission director at the U.S. Agency for International Development (USAID) in Kenya and East Africa.

"Resilience is the ability of communities, countries and systems to respond to shocks," she said, Hopefully by building more resilience within all these systems, which includes early warning, which includes the farmer level by building resilience we can reduce the effects of these shocks and be more prepared for them."

UN Agency Meeting on Armyworm Outbreak in Southern Africa

The U.N. Food and Agriculture Organization (FAO) held an emergency regional meeting in Zimbabwe on the spread of Fall Army Worms in southern Africa, which is already struggling with food shortages. The pests are destroying crops in Malawi, Zimbabwe and Zambia.

FAO coordinator for southern Africa Chimimba David Phiri said the meeting is aimed at finding a strategy to contain the situation. "Many countries are affected.... It is the countries that are going to offer solutions of a coordinated approach to control this. Now that we have this fall army worm, we cannot eradicate it. In the Americas, it has been there since 1957 and they have not managed to control it because it keeps evolving. So we cannot expect that it can be eradicated. But we have to find a plan for managing it from now onwards," Phiri said.

Experts suspect that fall armyworm might have come when the southern African region imported maize from the Americas during a El Nino-induced drought in the 2015/2016 rain season. The three-day meeting in Harare is also grappling with other plant pests such as the South American tomato leaf miner that has been found in Angola, Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. The bug has caused extensive damage, according to International Red Locust Control Organization for Central and Southern Africa Director Moses Okhoba.

He says the East Africa region is also on high alert, amid the spread of H5N1, a highly pathogenic avian influenza in 12 west and central African countries, and H5N8 in wild and domestic birds along the shores of Lake Victoria, in Uganda. He says resources are being stretched.

"So we need to quickly think how quickly the region as a whole, not only in the outbreak areas, but also those states that are protected by the activities that are undertaken within the frontline states. So generally, I would say whatever we propose [at the meeting] in terms of protection is crucial to ensuring that food is secure in the region. Otherwise we end up with a disaster," Okhoba said.

The FAO says more than 40 million people need food assistance in southern Africa, with Zimbabwe and Madagascar being some of the worst hit by El Nino-induced drought.

Disease 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***

Wheat and Barley farmers rank disease as one of the top factors limiting wheat and barley yields on their farms. Disease management is a key component of high-yielding wheat. Some diseases, such as take – all disease, must be managed proactively and cannot be controlled once they are established. Other diseases, such as foliar diseases caused by fungi, can be managed by the timely application of foliar fungicides.

Scouting for disease

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

Most wheat producers have their total disease management program in place once the seed is in the ground. By that time, decisions have been made relative to crop rotation, tillage/ seedbed preparation, variety selection, seed quality, seed treatment, planting date, seeding method, seeding rate, and soil fertility. Individually and collectively, these decisions can play an important role in influencing which diseases develop, their severity, and their effect on crop yield and weight. Because pre-plant and planting decisions are important in the management of wheat diseases, you need to understand how they affect disease.

Variety selection

Decisions relating to variety selection are, perhaps, the most important decisions in managing diseases. Every commercially available wheat variety has a unique range of reaction to common diseases. Which and how many varieties are planted determines the potential for certain diseases. Failure to consider the implications of variety selection in managing diseases is a costly mistake made by many wheat farmers. Select two or three varieties with the greatest amount of available resistance to the diseases most common in the growing region. It is important to plant more than one variety for this key reason: it is common for a single disease to severely damage a single variety of wheat or barley. When multiple varieties are planted, your risk level is reduced. Planting more than one variety, especially when different maturities are represented, also can help with the logistics of harvesting.

Crop rotation

Crop rotation helps in the management of wheat pathogens that survive between wheat crops in wheat residue. When a crop other than wheat is grown in a field, levels of wheat pathogens decline. This occurs simultaneously as the residue of previous crops deteriorates. Reduced levels of pathogens can translate into reduced disease pressure the next time wheat is produced. Rotation is helpful in the management of hidden diseases, such as Pythium root rot, and destructive diseases, such as take- all. Rotation of fields out of wheat and barley is the only practical means of controlling take- all disease. Rotation also can reduce infections by the fungi Stagonospora and Septoria. However, spores' blowing into fields from neighboring fields reduce the effect of rotation on these diseases. Maize is generally a good non-host crop to grow in rotation to wheat.

Tillage / cultivation

Ploughing wheat residue hastens the breakdown of residue that harbors certain disease organisms. This can help reduce levels of take – all and foliar diseases, such as Septoria leaf blotch and tan spot. For fields in a maize rotation, tillage prior planting maize should cause a significant decline in surviving wheat stubble. The year between wheat crops in this rotation also helps, except where high levels of the take- all fungus exist. In those cases, two or more years between wheat crops may be required.

To achieve the highest possible yields, sufficient stands are very necessary. To achieve the desired stands, excellent seed germination and development of seedlings is required. Using high- quality seed treated with a broad – spectrum fungicide and good planting techniques help good stand establishment.

Excess stands, however, encourage foliar and head diseases by reducing air circulation and light penetration into the canopy later in the season. Calibration of the equipment ensures achievement of sufficient but not excessive stands.

Nitrogen fertility

Too much nitrogen in the previous crop can encourage excessive growth that can increase problems with barley yellow dwarf and most foliar disease caused by fungi. Increased problems with barley yellow dwarf are as a result of an extended period of aphid activity when stands are dense. The same situation encourages infection and carry-over of foliar diseases, such as leaf rust, powdery mildew, and leaf blotch complex

Fungicide application

All fungicides must be applied within specific growth-stage. Fungicides provide the greatest benefit when plants are protected from disease between flag leaf emergence and soft dough. The most critical stage is typically from mid head emergence through flowering. This is the period in which fungicide applications are often most beneficial.

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

It is a bright day in the larger, Mau escarpments stretching from Narok through to Kuresoi. Farmers Daniel Kilesi and John Paul Munene survey the Canola plants on their farm, the sea of yellow blossoms, what they see brings smiles to their faces. "Canola flowers just put you in a good mood," says Daniel Kilesi. The farmers will have to wait a few more months to get really excited. By the next few months the flowers will turn into pods, and the flowers' black seeds, which contain precious oil, will be ready for harvesting. Mr. Kilesi and Mr Munene are part of a larger group supported by the Center of Excellence for Crop Rotation, a project by Agventure Ltd to enable farmers to grow rotation crops including canola.

Canola:

Grow it to Believe it

Explaining to Kenyans why Canola, a crop of Canadian origin is an ideal break crop for growing their profitability is perhaps the biggest challenge we faced. But the calls of duty could not allow any lapse. So our own ***Mr. Masila Kanyingi*** spent a week with the Center of Excellence for Crop Rotation agronomists, Jason, Jackson and Victoria going round some of the growing areas. The Center of Excellence is a project established by Agventure Ltd. The journey that started from Olchoro location in Narok County through to Mau Narok, Nakuru, Molo and ended at Mkulima location in Kuresoi was an eye opener. We visited the Agventure Ltd processing plant, large scale growers, middle scale growers, small scale growers and groups which were eager to learn how to grow canola. The word 'canola' is a contraction that stands for Canadian oil, low acid. The name comes from Canada, the world's largest producer of Canola. We link growers and consumers. That does not change even if the crop does, excerpt;

"The step-by-step transition to an economy free of carbon dioxide will not be possible without vegetable oils", says Mr. Jackson ole Yenko an agronomist with the Center of Excellence. Adding, "the total land area used for growing Canola in Kenya has more than quadrupled and Canola oil production has increased but it is not enough".

Why Canola Oil

Speaking to the ***Cereals Magazine***, Mr. Jason Kamunya, the project team leader with Center of Excellence said canola is the best rotational plant currently for cereal growers. To break the monoculture practice with most wheat and barley farmers, the Center of Excellence has slowly introduced canola to most medium scale growers in Narok, Nakuru, Laikipia, Meru, Nyandarua and Uasin Gishu counties.

The project, which started last year in partnership with SNV and Unilever, has targeted growers who need to break from one main crop and therefore canola is been placed as a rotational crop. "We train growers on good agronomy practices and the right seed varieties for the best harvest", said Mr. Kamunya. Canola is a profitable cropping option for many cropping regions in Kenya and it also brings diversity in terms of cropping rotations.

Introduction

Speaking to a group of farmers in Kuresoi, Ms. Victoria Misenda also an agronomist with the Center of Excellence said, "walking close to a canola crop in flower the strong cabbage smell will explain its origin as a member of the Brassica family which includes broccoli, cabbage,

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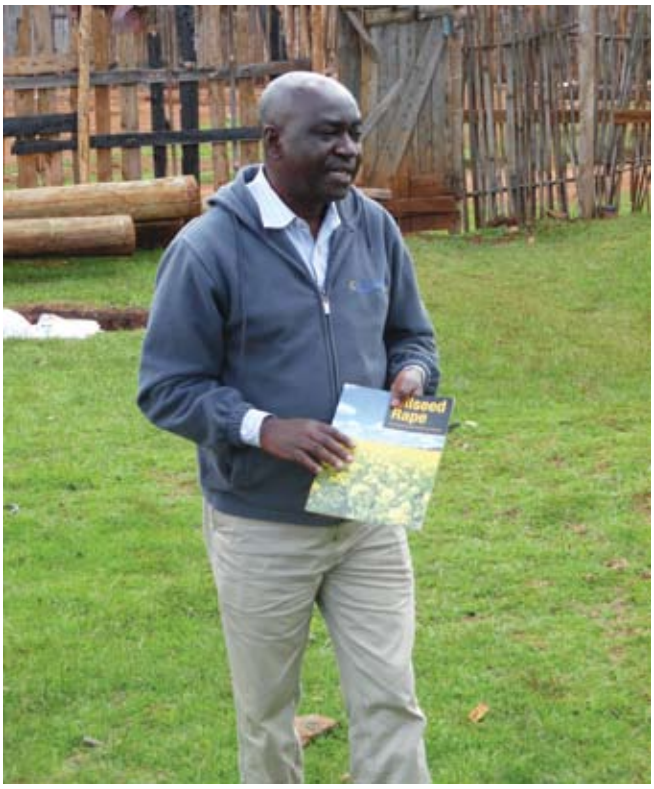

Mr. Jason Kamunya, Agventure Project Leader.

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cauliflower, mustard, radish and turnip. Canola is a variant of the ancient crop rapeseed, a word derived from the Latin rapum meaning turnip".

The physical description of the plant can be enumerated as:

Roots – Canola has a taproot system. Growth is rapid after establishment, with 85% of the tap root in the top 25cm of soil.
Stems – Stem height varies between 75cm and 175cm. The more widely spaced the plants, the more extensive the branches, which compensates for yield losses due to there being fewer plants.
Leaves – Plants produce up to six large, waxy, blue-green leaves per stem. After emergence, canola develops a thick rosette of leaves close to the ground before the flowering stem appears.
Flowers – Canola has small, yellow flowers and flowering starts on the main stem.
Seeds/pods – The round black, brown or yellow seeds are relatively small. Mature pods contain about 23 seeds. Pods on the lower parts of plants are about 30cm from the soil surface. Pods are prone to shattering if the harvest is delayed.

Cropping requirements

She told the farmers from Murinduko area of Kuresoi that canola fits well as a break crop in Cereal farms within 350 mm-700 mm rainfall range. It does well in medium to high altitude with average temperatures of 20 to 26 degrees centigrade. Soils should be relatively fertile well-drained medium loams to heavy clay. The ideal soil pH is between 5.5 and 7. For a cereal farmer, the essentials of growing wheat or canola are the same.

Land Preparation

Mr. Kamunya encouraged farmers to start preparing the land before planting. The soils must be loosened up by ploughing the land with the use of the cultivator attached to a tractor. Compaction must be dealt with within primary cultivations if it is an issue. After ploughing the land it is advisable to allow weeds to germinate then do a pre-planting herbicide. This will lower the weeds pressure after planting. The land is then harrowed to make the soils fine in readiness for planting. "The seed is tiny, you need to make the soils as fine as possible to avoid germination challenges", says Kamunya.

Given that the seeds are tiny; the rule of the thumb is the crop should not be planted deeper than the thumbnail size to ensure germination. "You need to mix the seeds with the recommended fertilizer depending on the soil analysis results done by Crop Nutrition Ltd through the Center of Excellence." says Mr. Yenko. Adding, "mix them thoroughly then putting them on the planter hopper. Set the planter to plant a depth of 1.5cm to 2cm and reduce the tractor speed to 5km/h. Have someone in the hopper who will continue mixing thoroughly to avoid sedimentation". He discouraged them from scattering the seeds for even distribution of plants.

Nutrition

Canola needs nitrogen and phosphorus fertilizer. Other nutrients such as sulphur are also important. Often large amounts of nitrogen are required depending on whether it is a first crop after grain crops (usually more nitrogen needed). Nitrogen can be applied before sowing, drilled with the seed or top-dressed. The rate applied depends on the soil analysis results, yield the farmer is targeting, and this depends mostly on the amount of rainfall the crop is likely to receive during the growing season and the date which it is sown. The rule of thumb is that canola needs about 80 kg/ha of nitrogen for every tonne of grain expected to be produced.

Weeding

Early weed control must be effective. Once established, canola is effective at crowding out weeds. Canola has tolerance to herbicides that will kill brome grass and other grass weeds, and can survive being sprayed with that herbicide while these weeds species are controlled or suppressed. To the farmers' advantage, canola forms a canopy, which helps in weed control.

Pests and Diseases

Canola can be affected by a number of insect pests, which may require chemical control if they start to cause significant crop damage. Adoption of an Integrated Pest Management or IPM system reduces, but does not eliminate, the use of insecticides by allowing the build up of beneficial insects, which may keep populations of pest insects in check. Canola crops are vulnerable Diamond Black Moth. Chemical control is often necessary and one option is to apply an insecticide in seed dressing. Other possible pests during the growing period include aphids and Cutworms. It is very important to use insect control methods, which have minimal impact on essential pollinators, particularly bees.

Mr. Jackson Ole Yenko, an Agronomist with Agventure

Ms. Victoria Misenda, an Agronomist with Agventure

Diseases are not very common currently with canola being a new crop. However, farmers should be alert and in most cases can apply a broad-spectrum preventive fungicide when the crop is about one and half months old.

Management

Farmers should keep scouting the fields for any insects and diseases. In case of any serious threat, farmers are encouraged to use the recommended insecticides and fungicides. At flowering, farmers should avoid spraying to avoid killing beneficials especially bees which are critical for pollination. Timing and methods of spraying can have a big impact on beneficials.

Harvesting

One thing to always remember when harvesting is to check if the crop is ready for harvest. To determine that, pick some seeds from top, middle and bottom. Mix them and crush them, mature seeds are 95% deep black in colour and when crushed they are yellow. Keep checking regularly. You can also use a moisture meter and ensure the moisture content is between 13 to 15.

Crops that are ready for harvest may spoil right away so be sure to harvest them once they are ready as not to waste money and resources. The speed of the combine harvester should be 3km/h to 5km/h with a raised reel to avoid shattering.

Marketing

The marketing of canola is well organised. All the farmers visited are with The Center of Excellence, which in association with Agventure Ltd offers a contract at a fixed price of Kshs. 40 per Kg The farmer is paid within a week of delivery. The seeds are then crushed and the oil sold to Unilever to use in new Blue Band. Agventure also introduced the Pure Mountain Farm Oil brand to the market in 2010. This is a cold-pressed Canola product, suitable for all types of cooking

Uses of Canola

Canola has many uses, both edible and inedible. It can be utilised for human consumption as canola oil, or blended with other vegetable oils for the production of various solid and liquid cooking oils and salad dressing. Canola meal, which is a good source of protein, can be used in animal feed and is recommended for up to 20% of the ration for dairy animals. The meal is also a high-quality organic fertiliser that can be used by commercial organic farmers. In addition, canola is grown as a biofuel.

Canola in crop rotation

Canola is an excellent choice to enhance or extend a crop rotation. It produces a high yield and can be a profitable crop in its own right as well as an excellent fit with cereals or pulses. The average yield of canola is 2 t/ha, which includes three drought years. Some farmers achieve yields of more than 4 t/ha in better years, especially in higher rainfall. Cereal yields after canola are often enhanced because of the disease cleaning that occurs when an unrelated crop type such as canola is alternated with cereals and kept free of grassy weeds. This can improve the rooting structure, making cereals more resilient to dry periods.

Canola's introduction gave farmers another crop to grow on their land, which has helped farmers to grow their crops more sustainably by reducing soil erosion and improving soil moisture. Previously, farmers managed their farms by growing wheat and then letting the land go fallow (which means no crops are growing). With the introduction of canola, farmers can grow **wheat-canola-barley rotation**. By having something growing on the land instead of nothing, farmers are helping to manage soil erosion better. Canola in the rotation allows farmers to better manage their weeds. As Canola is a broadleaf crop, and there are different herbicide tolerant varieties of canola, farmers have more options for weed control than in cereal crops such as wheat and barley.

Financial aspects

Mr. Kamunya agreed with one farmer that canola might not be profitable on the short-term face value. "A realistic target yield can be determined by calculating the amount of money earned by growing canola (in most cases lower than barley and wheat) the potential yields of subsequent crops to be grown and amount of savings from inputs after a canola cycle", he advised.
The long-term benefits for the whole cropping cycle are well established; as farmers who have grown the crop will attest to.

Canola: An Ideal Break Crop

Your Ability to Analyze a Situation is Your Biggest Effect

Neil Mitchelmore, is a UK graduate in Agriculture Chemistry with a crop protection career spanning to over 30 years with Syngenta plus its legacy companies, and was spread over two continents. Currently providing an agronomy consultancy also handling commercial project management for a number of companies, the Crop Dynamics brainchild is an enigma. After a one-hour interview with him one thing was clear in my mind. Leadership success is not a function of unalterable traits or unattainable pedigree. Nor is there anything exotic about the key ingredients: decisiveness, the ability to engage stakeholders, adaptability, and reliability. While there is certainly no "one size fits all" approach, focusing on these essential behaviours improve an individual leader's chances of succeeding in the role. Excerpts:

Neil Mitchelmore (Left) in a field training session.

Is canola the same as rapeseed?

No. Canola was bred from rapeseed, but their chemical compositions and nutritional profiles are very different. Canola has much lower levels of glucosinolates (which give mustard and rapeseed their sharp taste) and licosenic and erucic acids (two fatty acids not essential for human growth). To be called canola anywhere in the world, a plant must have 2% or less erucic acid in the oil and 30 micromoles per gram or less of the normally measured glucosinolates in the meal

What does canola look like?

If you've driven through Nakuru-Eldama Ravine road, you've probably seen fields of canola plants in bloom just before Kabarak. The plants range from 2-6 feet in height and produce yellow flowers. The flowers produce seedpods about 2 inches long, which turn brown as they ripen. There are 15-35 seeds in each pod, and 60-100 pods per plant, depending on the type of canola and the growing conditions.

Canola is relatively a new crop in Kenya, why should Kenyans grow Canola?

During continual monoculture of barley or wheat, yield progressively declines due

Neil Mitchelmore doing consultancy in a farm

Neil Mitchelmore advising a farmer

to a build up 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 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.

Why should cereal growers introduce canola in their cycle?

It is a fact that it is not only canola that can be used as a rotational crop. Farmers can still use sunflower, pulses etc. However Canola is known to have some key advantages especially:

Disease clean up: Canola has a totally different disease spectrum and thus breaks the carry over cycle of disease to 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 in canola which to control brome grass species (and others like ryegrass and setaria spp), which have become serious weed problems and very difficult to control within the cereal crop. The selective herbicides available for use in canola will give 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 wider range of beneficial soil bacteria and fungi. Also the large taproot generated by the crop will help open cracks in the soil, for improved drainage and deeper root growth, helping to reach into the sub-soil water and nutrient bank. It is advisable to grow it as 1 crop in 3 or 4 seasons in the same field to avoid build up of brassica specific diseases.

As a rotational crop, canola will help improve soil heath & provide a circuit breaker for cereal root & soil diseases such as Septoria, fusarium, alternaria etc

Financial Gains: The introduction of canola, say on a 3year cycle initially, will lead to improved net income and profitability over the period. The following crops after canola, generally yield higher as a result of the disease, weed clean up and gradual improvements in soil health. Reports as high as 20% yield increase in the following cereal crop have been reported.

How would you set up a successful establishment operations?

Every decision you make in good agricultural practices has an impact. Therefore to maximize yields a farmer must ensure proper land preparation for compaction removal. Canola grows well in medium to high attitude with a well spread rainfall pattern of >350mm per season. It does well in medium loams to heavier clay soils, which are well drained. If soils have a low pH (below pH 5), then the land should be limed before attempting to grow canola.

Compaction must be dealt with within primary cultivations if it is an issue. It is important to choose reasonably fertile fields and do soil analysis before planting to identify nutritional requirements.

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Neil Mitchelmore doing consultancy in a farm

Before planting farmers should do a Pre-plant spray to remove any weed population. A fine seedbed is needed in order to achieve good seed to soil contact. Cultivation should be the minimum amount to create the required seedbed – don't cultivate just to control weeds.

The aim should be to "Cultivate for the seed, Spray for the weed."

Seed rate depends on rainfall and soil fertility and is generally about 2-3 kgs/hectare in order to establish about 40-60-plants/sq m. High rates can cause lodging to occur. Canola seed is very small and once planted deep may not germinate well. Farmers must ensure planting is at a depth of 1.3 – 2.5cm and into moisture. A row width 15-20 cms (conventional) up to 30+ cms in low rainfall areas or zero till situations works very well.

If the farmer does not have a drill with a small seed box capable of sowing at these low seed rates then a compromise is to mix the seed with the fertiliser. Farmers must drill slowly to maintain seed depth & minimise bounce. Use of a press wheel or rubber roller useful to "firm – but not compact" is advised.

Ideally a quick & uniform emergence of seedlings is required, for the best yields. In canola growing maximum yields come from crops, which have at least 90% ground cover prior to green bud appearance. This type of canopy helps ensure light gets to base of canopy to maximise photosynthesis, dry matter (DM) production & branching. It will also improve ability of canola to withstand insect & weeds within first 6 weeks. It leads to even growth & maturity, more even ripening and easier management decisions

Seeds: Currently the two main seed varieties available in Kenya are Belinda (Bayer East Africa Ltd) and TT Hyola (Kenya Highlands Seeds). Agventure Ltd can provide seed from either of the sources. There are seed trials going on at KARLO looking for additional varieties, which are yet to be registered.

How is canola grown?

Fields are cultivated, seeded and fertilized. Herbicides/pesticides may be applied to control insects, weeds and diseases. Canola requires careful management, and the crop must be closely monitored for signs of disease. Seedlings emerge 4-10 days after planting. From a taproot, bottom leaves form a rosette, which sends up a flower stalk as the plant grows.

The fields are a sea of brilliant yellow flowers during the flowering stage, which lasts 3 weeks or more. Some varieties of canola are fertilized by wind and others self-fertilized. Bees are important in the pollination of flowers as they visit for nectar.

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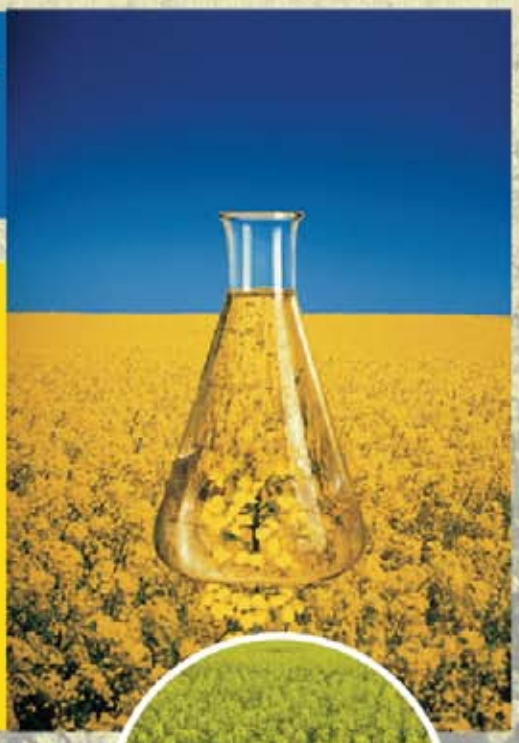
InVigor® Belinda

You'll be glad you planted it.

Belinda is a vigorous and high yielding oilseed rape hybrid with easy management

- High yield potential from thick, dense pod layer, with bonus of high oil content
- Outstanding Blackleg resistance
- Aggressive early–season vigor for good crop establishment
- Uniform growth promotes even maturity - lessens shattering loss, lowers dockage and results in higher grades



For further information, please contact:
CropScience Division,
Thika/Outer Ring road, Ruaraka
P.O.Box 30321, 00100 GPO, Nairobi, Kenya
Tel: (+254-20) 8600000
E-mail: bcs.ke@bayer.com/info.ke@bayer.com

Science For A Better Life

A blooming Yellow Canola Field.

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Once the flowers are fertilized, seedpods take 35-45 days to fill. The field is swathed when about half of the pods have turned from green to yellow or brown. The swathed crop dries for about 10 days and is then combined.

Is there an integrated canola nutrient management plan?

Canola has secured a place in cropping systems, as a profitable crop in its own right, as well as conferring rotational benefits on subsequent crops. Canola is grown in a wide range of soils types and will have particular nutritional needs. Nitrogen, Phosphorus, Potassium and/or Sulfur being the main macronutrients and Copper, Manganese, Boron and Zinc being the main micro-nutrients.

In any given situation, one or more of these nutrients may be limiting yield and so care should be given firstly to diagnosing where a response will occur if additional nutrients are supplied. Soil type, history and soil tests will all help with the diagnosis, but in most situations, under good agronomic practice, attention should first be given to getting the macronutrients “right”, and then addressing any potential micronutrient issues.

Canola needs about twice the N, P and K, per mt of yield compared to wheat/barley and five times more S per mt of yield. Test the soil to find the potential restrictions.

Therefore soil sampling is important; annually initially then every 2nd/3rd year. This will drive nutritional recommendations. To attain a target yield of 2.0 - 2.5mt/ha (initially), the crop will consume 80kg N: 32 kg Phosphate: 22 kg K (potash) & 20kg S (as a minimum).

Build a fertilizer program by addressing the potential nutrient demand based on the target crop yield. Start by getting P and K right at seeding, as there are no options for fixing P in-crop. Assess ongoing yield potential for N and S, and top-dress accordingly.

A good standby recommendation in absence of soil sample results would be 100kgs/ha DAP applied at drilling (max amount if seed is mixed with fertiliser), 100 kgs/ha Sulphate of Ammonia applied at rosette stage /stem extension stage (before green bud) and 100kgs/ha Urea, top dressed at stem extension stage (before green bud stage) Approx before 4-6 weeks from emergence and not later than 8 weeks.

Nutrients must be available in a balanced manner in soil solution. They must fertilise the following crop in relation to what canola is removed. Review the yield at the end of the season to assess if the crop was water or nutrient limited.

Discuss weeds in canola and their control

Broad Leaved weed control can be difficult. IMI tolerant or Triazine tolerant varieties do give the farmer broad-leaved weed control options with products that are available in Kenya. However for all varieties, herbicides for brome grass & other grass-weeds are available in Kenya. It is important to rotate chemistry where possible. Best weed control is achieved when weeds are in 2-6-leaf stage and actively growing. Where herbicides are not available, the use of slightly higher seed rates than average or using narrow planting rows will help Canopy management & weed suppression.

Maize Crop after rotation with Canola

Maize Crop in a normal monoculture field

What challenges does canola present to the farmer?

Main diseases in canola - Currently we would not expect many incidences of diseases, as being a new crop it is not yet intensively grown. Typically canola diseases we may expect in the future

Growers should be prepared for Leptosphaeria maculans: Blackleg / Phoma. This is carried over on canola stubble. Sclerotinia sclerotiorum is another canola disease. Sclerotia can remain in soil many years before producing fruiting bodies & ascospores. Both diseases have their spores spread by wind. The spores are captured by the petals. Later the petals fall into canopy and the spores can then germinate & the visible disease starts. It is advisable to grow next canola crop at least 500m apart or upwind from the previous crop.

Farmers should also be on the lookout for Alternaria brassicae- Black Spot. Concentric rings with yellow halo carried over on stubble, cruciferous weeds & seed. Spores spread by wind to the crop and by rain within the crop. It attacks all stages but mid flowering is most common. Main yield effects are due to premature shatter of the seed pod.

Lastly Plasmodiophora brassicae. (Club Root). Rootlets infected in the soil by spores & create a fungal colony (plasmodium) in the roots which cause galling of the root. This causes large losses in yield. Spread by machinery, field-to-field rotation is best cure (5 years). Also liming is of help - Club root thrives in acid soil.

Main pests in canola: Cabbage Stem Flea beetle adults attack early seedlings. (Cotyledons v susceptible. Shot-holing) Seed must be treated with systemic insecticide. Diamond Back Moth is another serious pest. The damage is done by larvae. This causes loss of green leaf during canopy stage. If more than 10% of leaf area is affected it is advisable to spray. It is less important as you get later in the crop's life although if populations of DBM are high at podding, some serious damage to pods & seed may occur and a repeat spray could be necessary. Currently we have several products, which can be used for control of these pests. Others pests are pigeons and cutworms.

Where does canola go when it leaves the farm?

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. A copy of the contract can be availed to potential growers by an Agventure Centre of Excellence for Crop Rotation Agronomist.

Currently most of the canola production is trucked to Agventure Ltd, where the seed is crushed, oil is extracted and meal is processed. Seed delivered to a processing plant is graded according to a strict international grading standards, maintained by Agventure Ltd. Payment to the farmer is done within 7 days from delivery.

Who uses canola oil and canola products?

Unilever are currently the largest consumers of canola oil in Kenya to manufacture Blue Band. Canola oil is renowned for its nutritional and culinary qualities. Canola oil can also be used in deep-frying, baking, sandwich spreads, coffee whiteners and creamers. Canola meal is used as a high quality protein ingredient for livestock especially diary animals.

David Jones
A Broadacre Specialist Agronomist at Crop Nutrition Laboratories Ltd.

Canola agronomy and nutrition

Canola is now a mainstream crop in Kenya, and for good reasons, it is profitable in its own right, improves the yield of following cereal crops, and givesexcellentcontrol of persistent grassweeds such as Bromes, Eleusine and Setaria. However, success with canola requires careful management however and close attention to detail to maximise its potential.

As with all crops, the establishment phase is critical. The small seed requires an accurate planting depth, and planting below 3cm will severely impair germination. The low seed rate, as often as low as 2.5 kg per hectare, means that the planter has to be accurately calibrated and the seedbed must be level to ensure even germination.

Dig a soil pit and look for signs of compaction before planting, and loosen with a chisel plough or subsoiler if necessary. It is important to level the ground afterwards, to conserve moisture and to allow the planter to achieve an even depth. At present the only effective Broad Leaved Weed herbicides are pre emergence, so a level seedbed also improves the effectiveness of the spray.

Thousand Seed Weight varies substantially for canola, from less than 4 grams per 1,000 seeds to more than 6 grams. Although Canola can compensate by producing large numbers of buds, plant population is very important as it affects maturity, disease pressure and final yield. For this reason I always advocate checking the seed weight, to plant by seeds per metre square, rather than by weight.It is very important to calibrate for this, to plant 50-60 seeds per square metre.

Overly thick crop canopies use light and nutrients less efficiently, and have higher disease pressure, and too thin a plant population results in lost yield and allows space for weeds to grow.

Seedbed fertiliser is important to get the crop away quickly from pests such as Flea Beetle and Millipedes. Always carry out a soil test several weeks before land preparation to determine liming and fertiliser requirements. I always advocate placing some nitrogen in the seedbed, and applying the rest by the 5 leaf stage.

Canola has a huge demand for Sulphur (S); the crop can remove up to 10kg S per ton of yield, so a 4 t/ha crop will remove 40kg of S. Compared to this wheat removes just 1.5 kg of S per ton of yield. Ammonium Sulphate is a useful and cost-effective

Yellow Blooming Canola Flowers.

product for applying Sulphur, but it must be applied before stem extension, and should be spread accurately which can be a challenge.

In most countries a two-spray fungicide program is used. However we are currently investigating whether this is both necessary & effective in Kenya, particularly against the key disease which is Sclerotinia. Foliar micronutrients can also be required in low doses. Canola is particularly sensitive to boron deficiencies, and it can be deficient in many Kenyan soils. Boron affects pollen production and seed set. Leaf tissue analysis is important to avoid spending money on unnecessary trace elements.

Monitor the crop right up to maturity for caterpillars such as Diamond Back Moth Larvae, and Mealy Cabbage Aphids, both of which can cause serious damage and yield loss, and apply an approved insecticide if required. Be careful to time the spray to protect pollinators such as bees – evening is safest.

Harvesting canola with a combine harvester crop requires care, and many fields – especially in shambas with lots weeds – will benefit from spraying off (desiccating) with glyphosate 2-3 weeks before harvest. Timing is important so speak to an agronomist.

Finally, set up the combine harvester correctly to maximize the yield and quality of the harvested seed:

- Lift the reel well up and match groundspeed to avoid shattering the pods
- Don't drive too fast
- If possible, use a side knife to stop the crop wrapping around the side of the header
- Shut the concave right down
- Reduce the fan speed as low as possible, before the sample becomes dirty
- Set the sieves as wide as possible, before the sample becomes dirty
- Keep a low drum speed to avoid small debris getting into the sample.

Young Canola Plant.

David Jones is the Broadacre Specialist Agronomist at Crop Nutrition Laboratories Ltd. Crop Nuts offers a full soil and leaf testing program for your cereals, as well as Consultant Agronomy Services for total crop husbandry.

Unilever, Agventure & SNV sign Memorandum

Kenyan farmers adopt conservation agriculture to double Kenya's canola oil production in 2017

Don White, Justin Apsey and Tom Derksen Signing the MOU

Unilever East Africa, Agventure Ltd. and SNV Netherlands Development Organisation signed a Memorandum of Understanding formalising a venture that aims to double canola oil production in Kenya by the end of 2017 via contract farming arrangements. Ambassador Frans Makken of the Kingdom of the Netherlands was present during the signing of the Memorandum of Agreement. The Dutch Embassy is funding SNV's five year HortIMPACT programme and considers the agreement an excellent example of the combination trade and development cooperation which forms the core of Dutch development cooperation policy. The agreement involves technical assistance to local farmers and a financial investment of KES 23 Million split among the three partners.

Canola is growing in popularity in Kenya. As a rotation crop it has numerous benefits for the soil and the farmers. It is a break with the past from traditional to conservation farming and as such, significantly reduces erosion, improves water retention and leads to fewer weeds, pests and diseases. The farmers' risks are more diversified compared to planting mono-crops and it increases their climate resilience. An approach that will result in higher yields and returns as well as reduced labour, fertiliser and pesticide costs.

Speaking during the MoU signing, Unilever East Africa MD Justin Apsey lauded 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 potential 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 7,000 MT peak demand for their Blue Band factory in Kenya is a perfect trigger to establish a sustainable local sourcing model.

On its part SNV, through a programme dubbed HortIMPACT, combines the expertise of the private sector with market based solutions to build sustainable and competitive agriculture markets in Kenya. As part of the agreement, SNV will work with Agventure, a local cooperative of large enterprise farmers that started growing canola and producing canola oil since 2010. Together they will scale up the number of local farmers and train them on approaches of conservation agriculture to make them more productive, profitable and resilient to climate change.

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 at least 3,000 MT by the end of 2017.

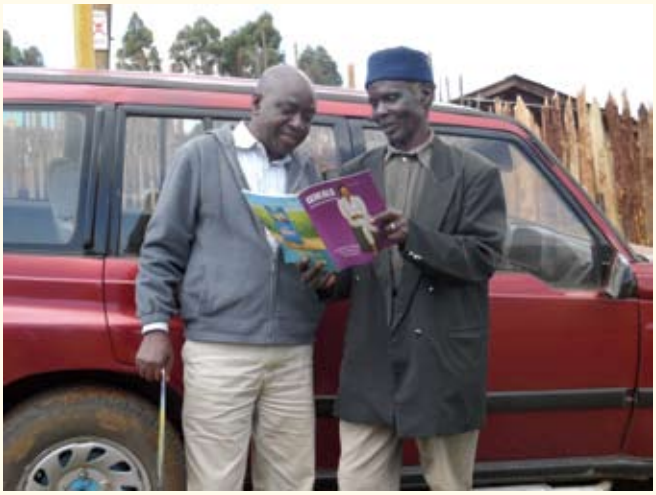
Tom Derksen, MD Agriculture and Energy at SNV: "This business case is the start of a wider Conservation Agriculture Revolution for farmers. It is an excellent example of how SNV works at the producer level, the company supply chain level and across the wider landscape to deliver livelihood benefits for 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."

CANOLA FIELD PICTORIAL

Land Preparation: Finely prepared John Paul Farm

Herbicide Spray: John Paul's staff spray before planting

John Paul in his farm



Cereals Magazine: Mr. Nyagah shares with Mr. Kamunya

Murinduko Group Keenly following the presentation

Murinduko Group Keenly following the presentation

Mr. Kamunya talking to the farmers

Murinduko Group Keenly following the presentation

Africa Can Feed Itself in a Generation

In many poor countries, however, farmers, small and medium-sized enterprises, and research centers do not interact in ways that accelerate the move beyond low value-added subsistence sustainable agriculture.

• Africa can feed itself in a generation. Its agriculture has suffered a century of neglect, but a new crop of leaders focused on economic growth is poised to turn it around.

• The prospects are within reach. Africa has access to a large pool of technologies that can be harvested to raise productivity, reduce post-harvest losses, and improve markets.

• Africa must invest in rural infrastructure, expand higher technical training, and foster regional markets. It can learn from its own achievements like those of Rwanda and Malawi, and others such as China, Brazil, and India.

• This study identifies three major opportunities that can transform Africa's agriculture into a force for economic growth: advances in science and technology; the creation of regional markets; and the emergence of a new crop of entrepreneurial leaders dedicated to the continent's economic improvement.

Strengthening rural innovation systems, developing effective clusters that can add value to unprocessed raw materials, and promoting value chains across such diverse sectors as horticulture, food processing and packaging, food storage and transportation, food safety, distribution systems, and exports are all central to moving beyond subsistence sustainable agriculture, generating growth, and moving toward prosperity.

Developed and emerging economies can do much more to identify and support policies and programs to assist Africa in taking a comprehensive approach to agricultural development to break out of poverty. This requires rethinking the agenda to create innovation systems to foster interactions among government, industry, academia, and civil society—all of which are critical actors.

Farmers are the Key

The New Harvest is guided by the view that innovation is the engine of social and economic development in general and agriculture in particular. The current concerns over rising food prices have compounded worries about the state and future of African agriculture. This sector has historically lagged behind the rest of the world. Part of the problem lies in the low level of investment in Africa's agricultural research and development.

African Agriculture is at a Crossroads. Persistent food shortages are now being compounded by new threats arising from climate change. But Africa also has three major opportunities that can help transform its agriculture to be a force for economic

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How to feed 45 million Kenyans without damaging the planet

Countries that have achieved greater national and household food security generally have a track record of strong support to agriculture, careful considerations of economic incentives for agricultural production, and human and economic investments in research, extension and training. To spark a new green revolution, Kenya will need to finance and equip research institutions, work with civil society and the private sector in several key areas, including:

Policies - Establish reasonable taxation systems, decentralize and support policies that provide more open access to markets and fair and predictable prices for produce. Ensure that a high priority is given to national and household food security in national development policies. Create an environment where smallholders, particularly women, can gain access to credit, markets and institutions and have secure land tenure.

Research - Work to ensure a clear focus on poverty alleviation in national and international research efforts. Give priority in research and investment to applications such as biological pest and weed control and IPM that can give higher and environmentally sustainable yields at lower cost, as well as to methods adapted to vulnerable and marginal areas. Agricultural research tends to be dwarfed by other priorities.

Extension - Improve extension service, training and research facilities, including national universities, targeting efforts at those who do not have secure access to food. Studies have shown that extension can play a vital role in promoting new methods and technologies.

Kenya can feed its growing population going by a global research done recently. Though it was not specific on Kenya, it can literally be used by policy makers and help the country rid off this nagging famine phenomenon. The evidence gathered by researchers shows that it is possible to feed the 45million, as long as five key recommendations are met: halt farmland expansion; close yield gaps on underperforming lands; use agricultural inputs more strategically; shift diets; and reduce food waste.

It was shown that it is possible to both feed hungry Kenyans and protect a threatened ecosystem but it will take serious work. But we can do it."

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growth.

The New Harvest provides policy-relevant information on how to align science, technology, and engineering missions with regional agricultural development goals. The book argues that sustaining African economic prosperity will require significant efforts to modernize the continent's economy through the application of science and technology in agriculture. In other words, agriculture needs to be viewed as a knowledge-based entrepreneurial activity.

The argument is based on the premise that smart investments in agriculture will have multiplier effects in many sectors of the economy and help spread prosperity. More specifically, the study focuses on the importance of boosting support for agricultural research as part of a larger agenda to promote innovation, invest in enabling infrastructure, build human capacity, stimulate entrepreneurship, and improve the governance of innovation.

Regional Cooperation

The emergence of Africa's Regional Economic Communities (RECs) provides a unique opportunity to promote innovation in African agriculture in a more systematic and coordinated way. The launching of the East African Common Market in July 2010 represented a significant milestone in the steady process of deepening Africa's economic integration. It is a trend that complements similar efforts in other parts of Africa. It also underscores the determination among African leaders to expand prospects for prosperity by creating space for economic growth and technological innovation.

One of the challenges facing Africa's RECs has been their perceived overlap and duplication of effort. Part of this concern has been overstated. The RECs evolved based on local priorities. For example, the Economic Community of West African States (ECOWAS) is by far the most advanced in peace-keeping while the Common Market for Eastern and Southern Africa (COMESA) has made significant strides in trade matters.

In the meantime, the East African Community (EAC)—one of the oldest regional integration bodies in the world—has made significant advances on the social, cultural, and political fronts. It has judicial and legislative organs and aspires to create a federated state with a single president in the future.

This book builds on the findings of the report Freedom to Innovate: Biotechnology in Africa's Development, prepared by the High Level African Panel on Modern Biotechnology of the African Union (AU) and the New Partnership for Africa's

Development (NEPAD). The panel's main recommendations include the need for countries in central, eastern, western, northern, and southern Africa to work together at the regional level to scale up the development of biotechnology.

Technology Innovation

The New Harvest aims to provide ideas on how to position agriculture at the center of efforts to spur economic development in Africa. It outlines the policies and institutional changes needed to promote agricultural innovation in light of changing ecological, economic, and political circumstances in Africa.

Using case studies of success stories, the book explores the role of rapid technological innovation in fostering sustainability, with specific emphasis on sustainable agriculture. It provides illustrations from advances in information technology, biotechnology, and nanotechnology. It builds on recent advances in knowledge on the origin and evolution of technological new harvest systems. Agricultural productivity, entrepreneurship, and value addition require specific efforts aimed at aligning science and technology strategies with agricultural development efforts.

Furthermore, such efforts will need to be pursued as part of Africa's growing interest in regional economic integration through its Regional Economic Communities. African leaders have in recent years been placing increasing emphasis on the role of science and innovation in economic

transformation.

The Eighth African Union Summit met in January 2007 and adopted decisions aimed at: encouraging more African youth to take up studies in science, technology, and engineering education; promoting and supporting research and innovation activities and the related human and institutional capacities; ensuring scrupulous application of scientific ethics; revitalizing African universities and other African institutions of higher education as well as scientific research institutions; promoting and enhancing regional as well as south-south and north-south cooperation in science and technology; increasing funding for national, regional, and continental programs for science and technology; and supporting the establishment of national and regional centers of excellence in science and technology.

The decisions are part of a growing body of guidance on the role of science and innovation in Africa's economic transformation. These decisions underscore the growing importance that African

leaders place on science and innovation for development.

However, the translation of these decisions into concrete action remains a key challenge for Africa. This study contends that one of the main problems facing African countries is aligning national and regional levels of governance with long-term technological considerations. This challenge is emerging at a time when African countries are seeking to deepen economic integration and expand domestic markets. These efforts are likely to affect the way agricultural policy is pursued in Africa.

Science and Productivity

The 2007 African Union Summit decisions paid particular attention to the role of science, technology, and innovation in Africa's economic transformation, and they marked the start of identifying and building constituencies for fostering science, technology, and innovation in Africa. They focused on the need to undertake the policy reforms necessary to align the missions and operations of institutions of higher learning with economic development goals in general and the improvement of human welfare in particular.

These decisions represent a clear expression of political will and interest in pursuing specific reforms that would help in making science, technology, and innovation relevant to development. However, the capacity to do so is limited by the lack of informed advice on international comparative experiences on the subject. The central focus of this book is to provide high-level decision makers in Africa with information on how to integrate science and technology into agricultural development discussions and strategies.

Africa is largely an agricultural economy, with the majority of the population deriving their income from farming. Food security, agricultural development, and economic growth are intertwined. Improving Africa's agricultural performance will require deliberate policy efforts, especially in universities, to the service of agriculture and the economy.

It is important to focus on how to improve the productivity of agricultural workers, most of whom are women, through technological innovation.

Way Forward

Halt farmland expansion. Reduced land clearing for agriculture, particularly in the tropical 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 substantial "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 could increase current food production nearly 60%.

Use inputs more strategically. Strategic reallocation could substantially boost the benefit we get from precious inputs. Today water, nutrients and agricultural chemicals are often used too much in some areas and not enough in others. . Improvements to fertilizer use efficiency and more targeted, locally refined recommendations need to be deployed. Agroforestry through the use of nitrogen-fixing trees is one of several options that can complement and ultimately reduce the need for inorganic nitrogen fertilizer. Post-harvest losses must be sharply reduced.

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 another 50%.

This Article has been adopted from the book The New Harvest by Havard Unversity Scolar Prof. Callestous Juma

Diversity of Roles
One Profession, Many Facets

Today, due to ongoing technical innovations in breeding, crop protection and tillage systems data, in industrialised countries a single farmer can produce enough food for 129 people

Farmers guarantee tomorrow's food security. Next to this essential function of food provision, they also fulfill a number of additional roles that benefit the environment, the economy and society. Innovators, entrepreneurs, employers or preservers of the environment – farmers embody a multitude of roles. Their daily chores don't simply consist of milking cows and providing grain for baking bread. The farming profession is much more complex, interacting with several disciplines that all have a positive impact on the farmers' own business as well as their surroundings.

Innovators: Farmers go high tech

Standing in his wheat field, a farmer examines his crops with the help of an application map on his smartphone. It shows satellite-generated images that depict field-specific environmental conditions such as soil and topography data.

This information is then translated into a recommendation for the most suitable dose rate of crop protection for each section of the field. The farmer can now make more precise agronomic decisions out in the field. And what may sound futuristic is already a reality on many farms around the world. And Digital Farming makes life easier for our farmers because they can spend far more time on decision-making.

Farmers have to get familiarized with modern technology because it will increasingly affect their farming practices. 1.3 billion people approximately 40 percent of the global working population work in the agricultural sector.

Looking back, innovations have always made farming more productive. This becomes particularly evident in industrial countries: 115 years ago, a single farmer was only able to feed four people due to the technological limitations of that time. By 1950, as modern agricultural machines came into play, each farmer became capable of feeding around ten people. Today, due to ongoing technical innovations in breeding, crop protection and tillage systems data, in industrialised countries a single farmer can produce enough food for 129 people. And the openness of farmers toward modern technologies is gaining even more importance: The global population now increases by 80 million people every year. By 2050, farmers will have to feed 9 - 10 billion people while coping with the decline of available arable land, limited natural resources and more erratic climates.

Farmers as food provider in industrial countries

Besides this global responsibility, many farmers also try to keep pace with the latest technologies so their descendants

have a good start when they succeed them. Farmers have to keep encouraging themselves and the next generation to get familiarized with modern technology because it will increasingly affect their farming practices. “My family has been here for seven generations, and I would like the farm to be here for another seven generations. The effective use of modern technology is the key to achieve this,” states an Australian farmer.

Entrepreneurs: Farmers strengthen the economy

Despite great efforts and long-term strategies to ensure global food security, the public often underestimates how far-reaching the farming profession is: A big part of global society doesn’t give much thought to agricultural production and the diversity connected with the farming profession.

Agriculture as an economic factor

Agricultural contribution to the GDP (Gross Domestic Product) globally average three percent. There are, however, considerable regional differences.

Indeed, many farmers are not only nurturers; they are also entrepreneurs, playing a vital role for the global economy. According to the World Trade Organization, world exports of agricultural products increase by an average of six percent. This growth rate is three times higher than the world average for all goods.

Furthermore, the agricultural sector account for almost one-tenth of the global merchandise trade. Yet farmers face many challenges because a lot of their actions often depend on outside forces, such as markets and currency.

They need an understanding of economics to calculate the risks and chances revolving around the farming business. Therefore, many farmers around the world have joined farming associations to stay informed about important economic developments impacting their profession.This is crucial because the farming profession is not only about using your hands but also about using your brain. It’s about highly capable individuals managing land mass responsibly.

As well, agriculture represents the world’s largest employer: Worldwide, 1.3 billion people work in the agricultural sector – this equals 40 percent of the global working population. In Africa, more than half of the working population is employed in the agricultural sector.

Sustainability Experts: Farmers preserve the environment

Many farmers understand themselves as preservers of the environment, going to great lengths to run their farming business sustainably. Most corporations as well as global associations support this approach through global knowledge platforms for sustainable agriculture that tests fieldwork in cooperation with farmers. They help contribute to a sustainable agriculture that is in line with the farmers’ economic success. In this context, they build on three core elements: integrated crop solutions consisting of high-value seeds and chemical and biological crop protection products; tailored services; and stewardship measures and partnerships.

This has seen many farms highly committed to reconciling economic success with protection of the environment: We show how the farming business can easily be combined with responsibility for the environment that includes also biodiversity,” explains a farmer who has already benefited from this sustainable concept.

In addition, preserving bee health and thereby increasing biodiversity is another priority.

It is all about showing farmers how to apply crop protection products correctly in order to protect themselves and to preserve the environment. One example of new, safe application inventions that is particularly bee-friendly is the Dropleg application, which allows a more precise treatment: “Its sprayers protect bees by reducing spray drift and avoiding crop protection products on the flowers.

In other countries, farmers preserve the environment by leaving a certain amount of their land untouched. “We can’t disturb this area. We try to reforest and continuously improve it,” a farmer says.

Technology, sustainability and socio-economic factors are central parts of agriculture, and, the people involved, namely farmers, don’t just do a simple job with a singular function. Instead, their profession influences our world in a multitude of ways. And all of these facets contribute to driving the future of farming and mastering global food security – one of this century’s greatest challenges.

Nelson Maina

How Modern Information Sharing Can Transform Farms and Lives

Kenya is a land of plenty, billed by respected institutions as the agriculture powerhouse of Africa.

More than three quarters of smallholder farmers in Kenya and the region are stuck with low yields at every harvesting season in what researchers attribute to a systemic information gap on vital farming techniques. The situation is further exacerbated by the changes in weather which have gone on to depress rainfall and ultimately take a toll on yields. Ironically Kenya is home to dozens of research institutions of international repute that continue to produce groundbreaking innovation and findings. From drought tolerant and high yielding crop varieties to state of the art pest and disease control arsenals, even Kenyan scientists have gone on to win worlds most coveted acclaims.

But farmers continue to struggle with varieties that yield dismal returns per unit area, pests and diseases that are responsible for up to 40 per cent of yield losses, post-harvest losses as produce takes long to get to markets, and even when they do poor prices as market forces like oversupply and rogue traders conspire against farmers.

It is a dicey situation, at a time when studies show that by 2050, nine billion of us will be demanding food grown from seed. Growing enough quality food from dwindling land will be increasingly difficult and the pressure will be on farmers to maximize yields and produce crops of ever higher quality.

Yet at the heart of reversing this sorry state of affairs lies information access. Interventions by institutions like Food and Agriculture Authority, FAO, have shown that farmers who are empowered with knowledge on even the basic of farm management practices have gone on to more than double yields. But government that once played this crucial role through the extension services seems overwhelmed if the number of existing extension officers are anything to go by. Even as the number of farmers grow, government seems to have scaled down on this all important aspect.

Still we must all make our hay while it is still shining. For provision of information to spur innovative ways of producing food is too crucial a role to be left to government alone.

Private sector and research institutions must step up to this challenge and avert a possible catastrophe. Farmers have indeed expressed thirst for farming information as has been evident with the plant clinics that agro input company Elgon Kenya has rolled out. The attendance has been overwhelming. Acting as platforms that bring together farmers and experts under one roof to interactive and compare notes, the clinics have been an eye opener, about the yawning gap between policy issues and farmers? realities and needs.

Inspired by the growing quest for information Elgon Kenya Ltd, has gone ahead to unveil a first of its kind information center at its headquarters to allow farmers receive professional advice and agronomic support before making any purchases. The idea is to ensure that farmers understand what they want to farm and farm it from a point of information. Such are crucial steps in transforming lands into acres of bumper harvests.

But times have changed and so has information distribution and with the ubiquitous technology, we have to court ICT if we are to count any tangible gains from the sector. It is heart-warming to see the revolution and disruption technology is having on farming, from managing voracious pests to informing farmers on the price of goods in various markets in real time. Players in this space have quoted a monumental shift in farming trends and improved earnings among farmers interacting with technology.

Elgon Kenya aware of this pivotal role is also embracing technology, with eyes trained especially on the young farmers who are finding solace and fortunes in modern farming. If we are to rope in our youth, we need to entice them with what appeals to them. The Elgon Kenya online information centre allows for real time interaction between the company's agronomists and farmers on any farming issues while allowing farmers to place their orders and receive them at the convenience of their farms. This not only saves time and resources but improves how information flows from providers to users.

Kenya is a land of plenty, billed by respected institutions like the Food and Agriculture Organization, FAO and World Bank as the agriculture powerhouse of Africa. We can indeed live up to this honour by going back to basics, like bridging the gap between research and our smallholder farmers by communicating.

Information for our farmers is power and a sure bet to increased yields.

Nelson Maina is communication manager at Elgon Kenya Limited

CGA FIELD DAY PICTORIAL

Ayub of Amiran talking to farmers

Edwin of Chemonics explains their project to farmers

A farmer discusing with Pioneer Seeds Staff

Mr. Bett of BASF keenly listening to a farmer

Try this.

At Syngenta, business was as usual

Mr. Kioko of CGA talking to farmers

Give us a copy, we have seen our photos inside.

In matters of cereal farming, he is unquestionably an authority, and he commands the respect of his peers, colleagues and competitors alike. His understanding of the agribusiness has been gained from his humble upbringing as a village boy to his present position as not only one of the leading growers of Canola, Wheat and Barley but also the chairman of the Barley Association. David Kilesi, himself a respected farmer with an entrepreneur leaning could not have been more resourceful than serving the industry he loves most, the farming industry. Farming cereals alongside family dedicated members, crossing every bridge as they get there and a great African family culture is what makes the efforts worthwhile, says Mr. Kilesi in a one hour field interview with Cereals Magazine editor, Masila Kanyingi

Meet Narok's David Kilesi

One of Kenya's Leading Maasai Cereal Grower

Who is David Kilesi?

David is a medium scale cereal farmer in Narok, a husband and a father. He exists for the sake of simplicity. I focus my efforts into taking on all the worries over cereal farming from my customers, leaving them to concentrate on their core business- paying me well for selling to them quality wheat, barley and canola. I do this through the assistance of my family who provide manpower and agronomists from different companies who offer me the technical support. Though lately, farming has not been paying well.

My contribution to the cereal sector is brief, crisp, penetrating, perceptible and a creative insight into the minds of consumers. It leaves memorable ideas, images and stories, where less is more and understanding triumphs over information. My training by the Europeans is and will always remain; no compromise for quality. That is why I have been able to serve as the chairman for barley association for several terms consecutively. I am also a very active member of Cereal Growers Association. I strive to satisfy my customers by providing them with products they require. I do this effectively and efficiently by operating and continually improving my quality to above expected standards.

Kindly give a brief background of David the farmer

Confucius said the journey of a thousand miles starts with but the first small step. Or the referred more evocative saying. The eating of an elephant starts with the first small bite. David was born in Olchorro by Maasai parents. I was trained by the Whiteman and the government as one of the first local to pioneer wheat, barley, canola (the Rape Seed) and potatoes farming. Previously it was dominated by the Europeans. To be precise, Mr. Paul Dick then a technical person with East Africa Malting and his boss Mr. Hunter trained me on barley farming. I was never employed and therefore ventured in cereal growing around 1972 in my 20s. From then I have never looked back and today am doing over 850 acres.

Farming seems to be the main activity in Narok and especially barley and wheat. Discuss?

When the Europeans left, the Maasai's were left without any education. However they left crop growing and cattle keeping. So, the Maasai's were forced by circumstances to get into farming. Initially sheep wool was paying but today the sector is dead. This has left the Maasai's to grow crops and mainly cereals though we still do a lot of potato farming. Most of our children even after attaining degrees come back to the farms. This is the only thing the Maasai's find paying.

In midst of our discussion, I have heard you talk of Canola, how did it find its way to the region?

As stated, Narok is Kenya's cereal basket and any cereal can do well in the region. In 1977/78, the then Managing Director of East Africa Industries Ltd, Mr. Wanjau visited Narok farmers. Their offices were in the same building with East Africa Malting and had known our efforts through them. His mission was to discuss a partnership with us on growing of a new crop named Rape Seed.

East Africa Industries Ltd recruited farmers who did canola in large scale. It was a great crop with a huge permanent market. Despite having minimal pests and diseases challenges, the crop could be destroyed by wind and rainstorm which are common in Narok. Additionally it needed more water than barley and a well spread rainfall pattern. It also fetched less money compared to barley. This forced most of the farmers to drop it and go back to barley.

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Mr. Kilesi discussing a technical issue with Mr. Yenko of Agventure when he called on him in his farm.

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Lately, Canola seems to be slowly cropping back, what can you attribute this to?

In a nutshell, the story of Narok has been the same as almost all of Kenya's fertile farm land: Erratic rainfall couple with growing the same crops year after year is having a devastating effect on productivity.

One of Mr. Kilesi's Sons

Soils that were once healthy are now depleted of crucial nutrients. Moisture that was once kept in the earth to nourish crop runs straight off to rivers. Weeds and diseases that were contained run rampant. As a result we are earning less and less from their harvests.

In this Mix, agronomists from Centre for crop rotation came in and took us through conservation farming. It is an ecologically sound, environmentally-sustainable solution to these challenges. Conservation Agriculture boost farmers earnings with a few principles so straight forward most commercial farmers adopt then minimise soil disturbance. This has already significantly boosted yields and profits.

In a lay man's language what are you telling your fellow farmers?

I mean we were introduced to crop rotation; repetitively planting the same crop ruins soil health and sustains weeds, pests and diseases. Minimum tillage and control of traffic- Using machinery to till the soil after harvesting creates a compacted layer of solid earth below the surface, called plough pan. On top of that there is a thin layer of poor-quality soil that has few nutrients and is vulnerable to run off when it rains.

Maintaining organic soil cover with previous crop residue ensures the fields are not stripped bare hence encouraging wind and rain erosion, means more moisture evaporates and prevents helpful soil fauna from developing. Weeds also find easier to germinate.

Kindly discuss crop rotation which seems to have brought in canola.

Agventure group has drawn and taken us through a standard four-year crop rotation which works best. This is subdividing your land into four equal pieces and a quarter planted with each of the four crops; **Wheat – Barley – Canola – Field Peas.** (Keep alternaing every season) Legumes fix nitrogen for cereal crops that follow, and crop variety means differing root systems plumb different depths of soil, increasing soil health and efficiency, which keeps more moisture in soil too. Pests and weeds struggle to find a foothold as crops change regularly.

The taproot breaks the plough pan which results to better penetration of water, oxygen and some helpful worms into the soil. This results into less land preparation hence saving some costs.

How would you compare Canola to Wheat and Barley and what would you tell other farmers who are not yet planting it?

Canola is a financial booster to the other two. Once you plant a cycle of canola, it improves the yield of the following crop approximately by 20%. The crop also uses less herbicides, fungicides and pesticides. It also saves money in ploughing. Additionally, Centre for Excellency for Crop Rotation agronomists help us technically on any other crop when they visit us and the company is a very good payer. Unlike the Rape Seed of 1970s, the approach the crop has been given is far much better. It is a crop that I can recommend to any grower.

Briefly discuss the history of Wheat farming in Narok.

Cereal farming in Narok is the oldest entrepreneur one can think of. But allow me to start my journey in 1966 when I saw the first wheat growing. This was followed by the settlers giving land back to the locals (maasai). An agreement between Lord Delamere stated that all the land south of the railway line was to be returned. All the land from Olopumoro to Naivasha then Olpusimoro and then N/Enkare was opened. The farms were big with few Maasai's hence a lot of idle virgin land.

Locals could not manage the capital intensive cereal farming. So the government came in and set the Tractor Hire services company, a big agricultural unit which was headed by a European. Next the Narok Wheat Board based in Nakuru was set and built some silos in Nakuru to store wheat. Then the Kenya Seed Company, Kenya Farmers Association, Mea Ltd and Cereals Board were created by the government.

This is the time farming was a great occupation. One was required only to open an account with the board and was eligible for a loan (cash and inputs). KFA was both the distributor of the inputs and also the payer after selling. Immediately the tractor Hire Services Unit would come in and cultivate for you, Kenya Seed Company would give you seed, Mea Ltd provide you with the fertilizer and Whiteman's aeroplane did the spraying.

Mr. Kilesi's Barley Field after a Cycle of Canola

After harvesting, the farmer delivered wheat to the board and got a receipt showing the amount of the delivery. A copy of the receipt was then send to KFA. The KFA office would take you through all the products and service you received and after concurrence, deduct what you owed them then give you the balance as your money. Most of the farmers earned between Kshs 15,000 to Kshs 50,000/. In early 1970s money had value and this is the time a number of locals, I included, bought the first Datsun Pickups at a cost of Kshs. 35,000 then.

How about barley, did it pay?

Serious barley farming in Narok was introduced around 1975/76. Barley was like God send crop to the Maasai's. The two varieties introduced, Tumaini and Procter were the best for the Mau escarpment and farmers were assured of 85% to 95% success. Barley paid well. It changed the livelihoods of the Maasai's. They built permanent houses, took children to school (Initially only one child was send to a school in a village) and bought their own tractors.

Despite the numerous challenges, the Mau Escarpment is still relying on barley for their financial income. The climate is good and even dew has enough moisture to see barley through.

What has made you successful as a farmer?

Discipline and planning. As most of you break for Christmas, Syngenta East Africa Ltd. drives their seed dresser to my house. After seven days they come back with the chemicals to dress my seeds. Thereafter, all systems start flowing from planting to crop management. I do not do impulse purchases but calculate the acreage, order for my chemicals (herbicides, insecticides and fungicides), and order for the diesel and keep money aside for maintenance.

What is your day like?

My day starts at 7am when I drive to all the different farms, do my scouting and give instructions on what should be done in which particular field. Thereafter if nothing much is happening, I drive to Narok town. In town I discuss both business and politics. Both the electorates and politicians around will always seek my opinion. Maybe because of my many years with the late William ole Ntimama who was my neighbour. But am not intending to join active politics, but always remain in the shadows.

What are your future Plans?

I will be retiring from farming very soon and hand over to the next generation. Three of my children have joined me in farming and become successful in their own. They have their own farms though they still use my tractors and combine harvesters. Three are successfully doing other ventures. The young who still depend on me will take over my farms and continue the baton. My role will purely remain non-executive and will not be involved in the day to day running of the farms.

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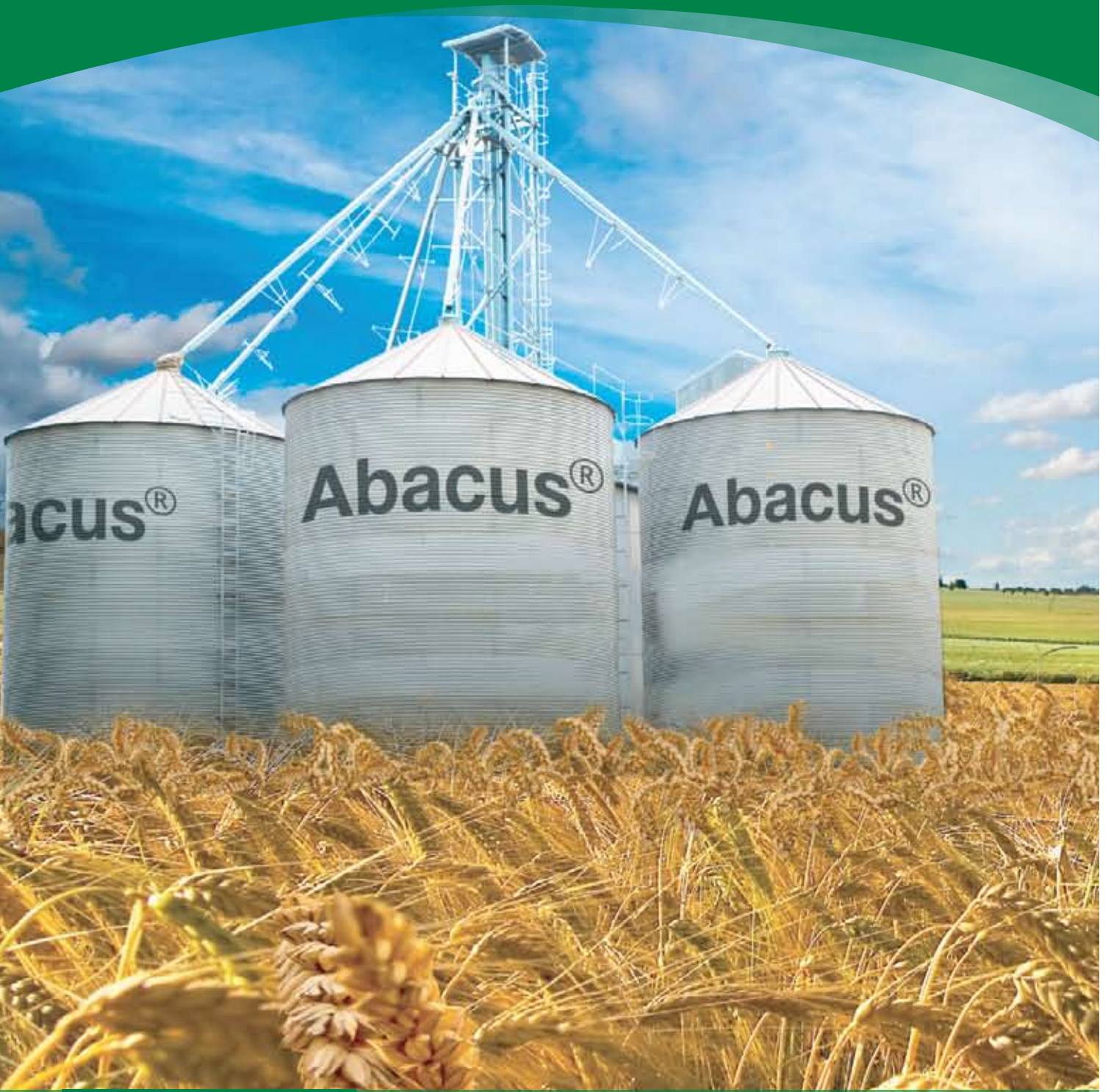

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Hermetic Storage Technology (HST) The post harvest loss solution.

Store the bags in a cool, dry place and wherever possible, preferably on a pallet. Avoid exposure to direct sun.

How it Works:
Once closed as per instructions provided, oxygen and other gases are prevented from entering or exiting the bag thus protects the dried grains and pulses from infestation damage that most commonly occurs during post-harvest storage.

The key precaution is to ensure stored grains and cereals are dried to the recommended moisture levels (13.5%) before storage.

Recommended crop for storage using HST: Maize, beans, cow peas, green grams, sorghum, millet, chic peas, and many other cereals.

Availability: In Kenya, the HST bags are available in more than 600 AGDs across Kenya and Tanzania.

Monolayer vs. Multilayer Liner
The hermetic storage technology (HST) bag consists of an inner liners and a woven polypropylene (WPP) outer bag for protection.

There are two technologies for the manufacturing of HST inner liners:-
The multilayer which consists of 5 or more layer co-extruded and blown with multiple compounds and joined together to form one super strong inner liner. It gives the best hermetic property in terms of oxygen transmission rate (OTR) and the bag strength. This is the latest technology and the HST bag requires just one multilayer liner to be effective.

> " Kenya as a country has experienced loss of human and animal lives as well as huge amounts of produce due to poor postharvest handling of produce in the recent past ".

Benefits of using the HST bags
Better Margins: Hardworking farmers and their families do not have to sell the grains and pulses in a hurry at the time of harvest and get the minimum prices, but store them in the HST bags and sell them later as the market prices go to increase their margins.

No loss of weight during storage
There is no moisture grain or loss when dried grains and pulses are stored in the HST bags, which normally happens in WPP bags and farmers lose 4 to 5kgs in weight per bag.

Financing Security & Stronger future
These addition margins would make the farmers economically strong to pay the school fees for their children, medical expenses of the family and funds to get seeds & inputs for the next season. Most small farmers are forced to sell their produce at the time of harvest at less process where's they could sell the same after 3 to 4 months by storing in HST bags thus ensuring over 67% increased revenue from sale of their stored produce. Farmers also get better market acceptance by the buyers if their grains are not treated with pesticide dust and are not infested.

Food Security
Farmers can store their grains at home without any worries of post-harvest damages and use their harvest when they need for

their family, instead of buying from shops at a higher price later. It would revive the granary concept, back at home, that seems to have extinct with the small hold farmers over the years.

Food Safety:
Since no pesticides are for storage, food prepared from these grains and pulses do not affect the health, hence, provides a healthy body and therefore a healthy mind.

Shelf Life:
The HST bag can be used for a minimum of three seasons, which is much below the cost of pesticide dust and the repeat dusting required in 3 to 4 months for the post-harvest storage.

Precaution before use:
The cereals and pulses should be dried to the recommended moisture content for storage purpose. The harvest should also be cleaned and sorted well e.g. to remove stones and other materials such as wood splinters or crop residues which could damage the liner, before storing in the HST bag and the inner liner should not be perforated or damaged when acquiring it or before reuse.

The bags should not be washed or perforated. There should be no addition of any pesticide dust to the grains stored in the HST bag. Store the bags in a cool, dry place and wherever possible, preferably on a pallet. Avoid exposure to direct sun. If the grains are already treated with pesticide dust before storage, expose them to sunlight till; the pesticide dust effect is minimized and then store them into the HST bag.

Rodents:
Normally the rodents do not attack the HST bags as the grains scent is sealed off when bags are secured tightly. Rodents are likely to attack the bags if the bags if the grains are spilled on the floor, therefore, the room where the grains are store, the doors, windows & eaves must be secures well with a wire mesh. Natural repellants are recommended for use to keep rodents away.

Price:
In Kenya the HST bag is available to the farmers at KES 250/- for 100kg and KES 150/- for 50kg.

Hermetic Storage Technology Bags are available in Tanzania to the farmers at TZS 4,500/- on an average, across the country.

Instructions to use:
- Place the HST Bag together with the inner liners.
- Pour little quantity of grains and adjust the bag to remove any folds.
- Fill with 100kg/ 50kg of the grains to be stored up to 2/3rd of the bag.
- Remove all air pockets from the top of the liner.
- Twist the remaining part of the inner liner, bend the twisted inner liner part and close it using a smooth tie.
- The outer bag is also closed in the same way as the inner liners with a smooth tie.
- Store the closed bags on- farm in a cool and dry placed preferably on a pallet.
- The room must be secured from rodents by using mesh on the windows and ventilators.
- When preparing to sell, remove the grain and pulses from the HST bag and pour into WPP bag of 90kg or 50 kg for transporting into the market.
- Fold the empty HST bag and keep safety for the use in the next season.

Cooking Oils: Time to make the Right Choice

Mr. Giles Littlewood in his office at the processing plant

Some people think that all fat is bad. In truth, fat is an important part of the diet, providing the greatest output of energy per gram of any food. In addition, fats help keep us warm, and regulate the immune system. They contain essential fat-soluble vitamins and fatty acids and improve the flavour of food. However, there is general agreement among health professionals that the type of fat consumed is as important as the total amount eaten. That's why it's important to choose healthier unsaturated fats, like canola oil. Eating too much and the wrong kinds of fats – saturated and trans – can cause an imbalance, raising the bad LDL cholesterol and lowering the good HDL cholesterol, which can increase blood pressure, narrowing of the arteries (atherosclerosis), heart attack and stroke.

Canola oil is one of the healthiest vegetable oils available to consumers. Fats, like canola oil aid in the absorption of the fat-soluble vitamins A, D, E and K.

Processing

Mr. Giles Littlewood explained the process in details. After cleaning, the canola seeds are rolled or flaked to rupture the cells and make the oil easier to extract. Next the seeds are cooked and mildly pressed to remove some of the oil and compress the seeds into large chunks. The oil extracted during each step is combined and then processed for different product uses. Different treatments are used to process salad oils, margarine and shortenings.

Step 1: First the seed is thoroughly checked for quality parameters and then cleaned.

Step 2: Next the seed is pre-conditioned with heat and then flaked using rollers. This ruptures cells and makes the oil easier to extract.

Step 3: Next the flaked seeds are cooked and subjected to a mild pressing process in the expeller that removes some of the oil and compresses the seeds into large chunks called "cake fragments."

Step 4: The cake fragments undergo further processing to remove most of the remaining oil.

Step 5: From the extractor the oil and meal are then processed separately, according to the end product requirements. Different treatments are used to process salad oils, margarines and shortenings. The meal may be processed into pellets or left as a loose mash.

"Unilever is currently the biggest buyer of canola seeds from farmers; therefore, there is a big opportunity. The oil is among the ingredients used in Blue Band margarine processing," Mr Littlewood of Agventure Ltd Processing Plant said. Adding, "Currently we are only able to produce a proportion of the Unilever demand, due to a shortage of raw material, but the aim is to reach 100% local supply which will require 14,000 tons per year of seed". The oil plant, which contains Omega3 and Omega 6 vitamins vital for brain development, grows in both high altitude and drought-tolerant areas, the researcher said. Mr Littlewood appealed for more farmers to grow Canola as the company does not have enough seed to crush. Currently it is only doing a quarter of its capacity.

Why use canola oil

Canola oil is one of the healthiest, most versatile cooking oils in the world. It is:

Low in saturated fat. Canola oil has the least saturated fat of all culinary oils - less than half that of olive oil. In fact, the U.S. Food and Drug Administration authorized a qualified health claim that just 1 1/2 tablespoons of canola oil per day may reduce the risk of coronary heart disease when used in place of saturated fat.

High in monounsaturated fat. Canola oil is one of the top cooking oil sources of this beneficial fat, which lowers "bad" LDL cholesterol and helps control blood sugar.

High in omega-3 fat. This anti-inflammatory substance, known as alpha-linolenic acid (ALA), may improve heart health. It must be consumed as the body cannot make it. Canola oil has the most ALA omega-3 of all cooking oils. Just one serving provides 81 percent of the daily recommended intake of ALA for adults.

Free of trans fat and cholesterol. Trans fat contributes to heart disease risk by increasing LDL cholesterol and lowering "good" HDL cholesterol. Too much dietary cholesterol also raises the risk of heart disease.

A good source of vitamins E and K. One serving of canola oil provides 16 percent of the recommended daily intake of vitamin E for adults, a nutrient that can fall short in the American diet. Vitamin E is an antioxidant that may help protect the heart. Vitamin K helps maintain normal blood flow and canola oil contains 20 percent of the recommended daily amount per serving.

A good source of plant sterols. Canola oil is second highest in plant sterols of all vegetable oils. Such sterols may reduce the risk of heart disease.

The best value for health. All of the above heart-healthy components of canola oil are just pennies per serving - a simple, affordable investment in one's health.

Canola Cake

After crushing, nothing is lost. The seeds contain 40% oil and 60% cake, a by-product which is a premier source of dairy protein. It has a 35%-40% protein and is low in fibre. It is very popular with dairy farmers with most reporting an average 20% milk increase

Weeds in a Young Maize crop Field.

Integrated Weed Management

At the International Weed Science Congress in Prague, scientists from 57 countries came together to discuss the way forward in weed control and possible solutions against the global problem of weed resistance.

With the number of herbicide-resistant weeds growing dramatically worldwide, scientists at the Congress agreed that breakthrough innovations in weed research were urgently needed in order to address the severe agricultural problems of today and tomorrow. “It is high time that we speed up research in weed control,” said Hermann Stuebler, Head of Weed Control Research at Bayer, in the opening speech. “In order to prevent new resistances from spreading and preserve the efficacy of current weed control solutions, we need to provide farmers with new tools so that they can diversify their weed control strategies. For many farmers worldwide, new and resistance-breaking herbicides are a question of economic survival.”

In combating weed resistance, most manufacturers must emphasize on innovation, partnerships and dialogue. Main weed research activities should concentrate, on engagement in understanding resistance mechanisms, testing and developing new concepts and tools to manage resistant weeds, and communicating and sharing their knowledge and solutions.

Agrochemical companies should dialogue and showcase their activities which should be geared towards holistic approach to weed management and supports a strategy of developing integrated weed management (IWM) solutions for sustainable agriculture. IWM Program offers farmers customized solutions for weed control through cutting-edge seeds, crop protection products and a wide range of services such as diagnostic tools and prediction models – all backed up by the latest scientic insights. Bayer implements its IWM Program in local initiatives according to best weed management practices.

The battle for yield

Around 30,000 weed species worldwide are reducing the quality and volume of crop yields as they constantly compete with crops for nutrients, sunlight, space and water. What’s worse, the number of herbicide-resistant weeds is also growing fast: 252 of the 1,000 worst and most common weed species have developed resistance to 23 of the 26 known herbicide sites of action and to 161 herbicides in 91 crops and 67 countries (as of 19.12.16). Moreover, no new modes of action that could potentially control them are expected in the near future.

How weed resistance occurs

In every weed population there is a certain range of natural diversity in the genetic makeup of the plants. Naturally occurring mutations due to cosmic radiation or a plant’s internal DNA repair mechanisms, for example, contribute to this genetic diversity. Besides, several generations of a weed may well be exposed to several herbicide applications at different times during the cropping season. After application of a herbicide with a specific mode of action, there is always a chance that a few weed will survive and produce seeds or in the case of perennial species, rhizomes or other vegetative propagation structures. If the same herbicidal mode of action is applied again and again with no complementary non-chemical weed-control measures, the risk of resistance increases fast, and resistant weeds can soon take over an entire field.

How weed resistance develops – a theoretical example

Actual development depends on the particular weed and cropping system.

How weeds are best managed

Weed seeds return to the soil at the end of the season, only to emerge again and compete with crops. It is essential to implement management tactics to reduce the weed seedbank.

Some examples are detailed below:

• Implement a crop rotation that puts target weeds off balance.

• Implement soil management techniques that help to reduce the weed seedbank, e.g. stale seedbed, tillage or deep plowing.

• Apply weed seed control tactics at harvest time, e.g. mechanical and cultural practices that capture and destroy the weed seeds before they replenish the soil seedbank

The Reality About Weeds

When you focus on what makes production agriculture tick, it comes down to just a few things. We love the land. We work every day to ensure a bright future for our families. And we want that bright future to be passed on to the next generation.

All of us worry about the Farm Bill, commodity prices and inputs, but when it gets down to the field level, weed management may just be one of the key issues of this decade. Can you imagine a drive across this country without seeing actively growing crops? If growers allow tough-to-control weeds to get the better of them, economies of scale have proven that weeds can overrun fields and decimate today's and tomorrow's profits.

The best way to preserve the effectiveness of weed control technologies is to ensure good control and eliminate weed seed production. It's important to seize each and every opportunity to stop surviving weeds from producing seed. This will reduce the soil seed bank and selection pressure.

Game-changing solutions

We take weed management very seriously, using our extensive experience to work with you on innovative, integrated solutions for productive and sustainable farms. Crop Science is dedicated to bringing game-changing technologies to the local market to address the most important agronomic challenges farmers face. These solutions affect not only your profitability, but contribute to agriculture by providing healthier, more plentiful food for the world, one harvest at a time.

Our responsibility to provide effective weed management includes our Respect the Rotation initiative, which elevates the importance and grower adoption of herbicide diversity through the rotation of crops, traits and modes of action.

Crop Science also works with agronomists and university experts to continue to study the science of weed management. On our YouTube channel, you can see video clips of both growers and experts discussing this ever-changing issue and their belief in the power of good stewardship.

Tools to carry your farm into the future

But it doesn't stop there. Crop Science is a leading provider of herbicide-tolerant trait platforms and crop protection products to carry your farm into the future, ensuring that you have access to robust weed management programs.

Best Weed Management Practices

With no new modes of actions or technologies in sight, there is an urgent need to sustain the effectiveness of current products until new technologies can be developed and introduced. That's why at Bayer we are encouraging farmers to help themselves by keeping herbicide technologies working well.

In practical terms, diversity means farmers need cross-crop rotation to vary their traits and crop protection products and practices, and combine them with non-chemical measures that reduce weed populations.

Tips for effective weed management

At Bayer we recommend that farmers follow these guidelines to enjoy the benefits of profitable and sustainable weed management:

Knowledge Exchange

Harry Strek in Frankfurt has a similar opinion: "We want to deliver consistent messaging based on sound scientific results. Farmers need to understand that herbicide resistant weeds are a problem that concerns every party involved in growing a crop but ultimately that the farmer alone has control over what goes on in his field." Strek regularly visits farmers worldwide to share his experience face-to-face and gain valuable local insights. During these visits he and his team translate their research results into concrete and clear messages: "We want farmers to understand the importance of what they can do to make farming and controlling weeds a more sustainable practice. This includes following a good crop rotation and applying varying herbicides and supplementing this with non-chemical weed control measures. Because always using the same mode of action greatly increases the potential for developing new resistance," Strek summarizes.

In most cases, his advice distils down to this: Using healthy crops to outcompete the weed, employing regular crop rotation and tillage and applying herbicides judiciously. "Diversity is the key and good agronomy is essential to sustaining the effectiveness of existing herbicides. The days of just being able to spray and forget are over. We need to be smarter about our use of precious chemical resources. It's technology and brains combined," says White.

Another Australian contributor to the international effort is Tim Scott. He manages a farm in Arthur River, in the southwest of Western Australia and also works as an agronomist at Agvivo, an agricultural consulting company. "We develop farm management plans together with the growers by taking the weed populations in their paddocks and their use of herbicides in the past into account," explains Scott. "Based on this analysis, we help the farmers decide which herbicide to use in that particular year."

The agronomist has done a lot of resistance testing with growers in the last couple of years and his work has been invaluable to get a better idea of what the local farmers are dealing with in terms of herbicide resistance. He even has a triumph to report: "Last year was regarded as a landmark year because the level of ryegrass resistance against one herbicidal compound decreased for the first time in five years. This is a trend that we must continue to support."

The Australian success stories demonstrate that these and many other diverse efforts being led globally by researchers, inventors, farmers and agronomists are already contributing to a more sustainable control of weeds. "Nonetheless, resistance remains a big and growing problem around the world. It must be recognized as a major threat to the future of agriculture. To date, 246 different weed species have evolved resistance to common herbicides, diminishing yields by up to 70 percent. We don't have the luxury of increasing the surface area we farm, so we must increase our farming efficiency. A major part of this is a better control of weeds and keeping resistance issues under control," says Strek.

Courtesy:
Bayer Cropscience Magazine

SNV: Strengthening the horticulture sector in Kenya

Are you part of a company with an innovative business idea, market proposition, or new technology that can reduce food losses, improve food safety and promote farmer inclusion in the market value chain? We can connect you to new opportunities, provide advice and support for farmer training and demonstrations, business investments and market access. Just contact one of our experts, challenges Mr. Francis Shivonje during an exclusive interview with Cereals Magazine.

The canola project with Agventure group and Unilever is one of the many projects we are currently supporting in Kenya. HortIMPACT supports Kenyan companies to showcase innovative and commercially proven technologies & services for improving productivity, enhancing food safety and reducing post harvest food losses to entrepreneurial small & medium size farmers, to enable them to secure profitable access to domestic and export markets.

The Agventure group had perfected conservation farming in their farms and canola was the ideal break crop for 60% of their farms. The industry response towards canola oil was huge with Unilever being one of the main buyers. SNV realised that canola was similarly doing well in potato growing areas and could also be used as a break crop to control emerging diseases, conserve soil and speed up rotational farming to small and medium scale farmers.

"Given that Agventure Group were already in conservation farming using Canola as a break crop and had a ready market for the crop, and while on the other hand Unilever, which has been importing canola oil, was interested in sourcing canola locally, a partnership to promote the crop amongst the farmers as a rotational crop emerged. With SNV coming on board to provide technical assistant the triad was completed. SNV is experienced in working with small and medium scale growers (SME farmers) and connecting them to the market, a working relationship that was most appropriate for the benefit of all", says Mr. Shivonje.

This saw the signing of a memorandum of understanding between the three companies formalising a venture that aims to double canola oil production in Kenya by the end of 2017 via contract farming arrangements. SNV will finance training of the contracted SME farmers, Agventure provide the technical aspect of canola production and conservation agriculture and Unilever will buy the final product.

SNV is now working with Agventure, to scale up the number of local farmers and train them on approaches of conservation agriculture to make them more productive, profitable and resilient to climate change. This will foresee a total of 500 local farmers trained in conservation farming approaches and farming canola, resulting in doubling the annual supply of locally sourced locally by the end of 2017.

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 landscape to deliver livelihood 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.

The project fitted well with our aim to market oriented and inclusive supply chains

built upon effective business linkages between small & medium size farmers and up-takers. Today the project has grown to Uasin Gishu, Narok, Nakuru, Nyandarua and Timau among other areas. The small & medium size farmers with the business skills and entrepreneurial vision have developed and expanded market opportunities for increased incomes.

Through the Agventure agronomists, the farmers have enhanced on-farm skill and productivity gained via training, the introduction of new technologies, and engagement with bigger players in canola growing. This technology prepares them for the challenges currently facing the country's horticulture namely global warming and minimal rains. It helps them produce in such harsh climates. This partnership has seen the small scale farmers gain financially by selling canola to Agventure. The farmers have also embraced conservation farming and seen the benefits of canola as a rotational crop in improvement of soils.

Other Projects

Currently the HortIMPACT project implements 7 business cases. In these business cases, companies have to come up with at least 50% of the necessary funding, while SNV derisks the investment by providing the remainder of the budget. All the business cases are led by companies that play an important role in supporting small and medium size commercial farmers to develop their farming business. The pivotal role of companies is key to make sure that investments that benefit farmers will be sustainable in the long run. Each business case that HortIMPACT supports needs to address one or more of three themes that are central within the project: inclusive business, reduction of food loss and improvement of food safety.

1. Promoting Inclusion

HortIMPACT links entrepreneurial small & medium size farmer groups to innovative and proven technologies and techniques to increase farm productivity, quality and efficiency so they can compete in commercial markets. The programme brokers connections between these farmer groups and other actors in the value chain to build business networks for fair access to domestic and export markets.
The programme is also committed to the fair participation of women and youth in horticulture value chains, and addresses barriers to their active participation through targeted interventions for business and leadership development. HortIMPACT is also working with national and county government agencies for policies that support market inclusion in a sustainable way.

2. Improving Food Safety

Most fresh fruits and vegetables for the local market are sold through open-air markets and roadside kiosks. Typically pesticide use during production is not closely monitored and pesticide residue, heavy metal and microbiological contaminant tests are rarely done. As a result, concern over the safety of fruits and vegetables consumed in our domestic markets continues to grow amongst consumers, impacting dietary diversity and limiting market growth. HortIMPACT in partnership with the relevant national & county government institutions, agrobased companies, and entrepreneurial small & medium size farmers introduces practices such as GlobalGAP and IPM to ensure safe quality fruit and vegetables for consumers in the domestic market.

3. Reducing Post-Harvest Losses

Post-harvest food losses reduce saleable market stock and income, and can lead to higher consumer prices. Reducing food losses is also important in safeguarding affordable access to diverse fruits and vegetables, essential for the nutritional needs of healthy communities. To tackle this issue, HortIMPACT is introducing small and medium size farmers to best practices and technologies such as improved crop varieties, effective packaging, storage solutions, and efficient transportation.

The HortIMPACT Business Cases:

HortIMPACT concentrates support on a number of promising business cases with agribusinesses and farmer groups, selected because they are economically viable, innovative and scalable. These business cases offer exciting opportunities to grow an inclusive horticulture market by addressing productivity, food safety and post harvest losses. These business cases include:

1. Promoting innovative technologies in vegetable production to farmers including greenhouse technology with Kenya Highland Seed Company.

2. Improving Ware Potato Supply to Processors by SME Farmer Groups.

3. Improvement of food safety through adoption of IPM and training of professional spray service providers (SSP).

4. Promoting the use of conservation agriculture for canola production through SME outgrower scheme.

5. Strengthening the capacity of Latia Resource Centre to provide Farm Operator Training and business support services to the rapidly growing greenhouse farming sector in Kenya and the East Africa Region ("Centre of Excellence").

6. Reduction of post-harvest losses through value addition for Mango value chain in local and export markets

7. Stimulating food safety of green leafy vegetables through improved production technologies such as net houses.

HortIMPACT will share the knowledge and insights gained from these business cases with farmers, and policy makers to scale up and extend the approach.

Murinduko; Coming Back Soon

Jason had a great sense of humour and a knack for making everything fun. One thing that resonated with me, even as we drove towards our destination, was how much he seemed to enjoy our company and found ways to entertain us. What was so funny about a drunkard who never respected Mututho rules and zigzagged on the road speaking to self, women carrying half sack full to the market? Boys looking after cows as they played polythene paper made balls and girls carrying 20 litre gallons of water on their heads, this is a normal picture in the village but Jason found fun out of all these. Maybe he did this to kill the crippling boredom and keep himself alert after almost three hours drive.

Half an hour past ten o'clock, Jason pulled off into an empty lot of the Mkulima location chief's office. Welcome to Murinduko, said Jeremiah Cheruiyot a middle aged man and the chairman of the group. Murinduko dates back in early 1980s when the then settler's farm which had been acquired by ADC was bought by the society. It was then subdivided to the current owners.

Pastor Kinyanjui who has lived in Murinduko since he was a boy in 1950s takes over the narration. The farm has a rich history with the first owner remembered as brigadier who then passed the farm to an Indian settler after the Second World War. It was then acquired by Sino Ltd who together with their neighbours planted wheat, barley and pyrethrum with some minimal dairy farming. Next was an Italian who was also doing same crops before the farm was acquired by ADC. Murinduko, a society from Kirinyaga then bought the farm from ADC and the members continued doing pyrethrum and introduced potatoes.

Recently the farmers had been contracted by East Africa Seeds Ltd to do some seeds a venture that has been very successful. The group which is very organised has Jeremiah Cheruiyot as the chairman, Grace Wanjiru Vice Chairperson, Joseph Wainaina as the Secretary, Samwel Warui assistant secretary, Winnie Chelagat the treasurer and Ezekiel Nyagah the organising secretary. Mr. Nyagah who had already visited the canola processing plant at Nakuru was full of praise for Agventure group and their new venture to introduce canola. Murinduko is the face of Kenya with nearly half of the tribes living harmoniously with each other.

Speaking to the group, Mr. Jason Kamunya thanked the group for coming together to prove to the rest of the country that lack of big chunks of land is not a hindrance to Canola farming. He told them that canola can also be used as a break crop in potato farming. He took them through the canola story I had got used to after listening to it for two consecutive days from the pair in different scenes. But every time I listened to it, new things kept on cropping out. Today it was the rotation with potatoes.

During the interactive session, Jason and Victoria were bombarded with all manner of questions which the poor journalist who had accompanied them could not help. First it was the old man who wanted to know whether they can drink canola oil, then the young man who asked about payment terms, a middle aged lady who wanted to know why they should trust Centre for Excellency for Crop Rotation. Many more questions kept on coming up as every answer resulted to a question. Jason and Victoria handled them excellently in turns at times complementing each other. However, some of the locals could not hide their male chauvinism as they always asked for assurance from Jason after Victoria had answered them religiously. The pair knew their stuff well and I could not hide my jealousy as they spoke while I was dumb hiding my ignorance in my pen and paper.

Then a young man narrated how his father visited the hospital with chest problems and was told by the doctor to buy canola oil and take a tea spoonful twice daily. He informed them that since his brother started buying it from a Nakuru shop, it has helped his father who can know breathe without serious problems. Everyone was now curious with the medicinal value of the crop. Jason cautioned them and clarified that they could not assure them of its use as a medicine.

As my kinsmen say, a donkey will always ride on the respect of cows and to be fed. I joined them as we were treated with the rich natural village lunch far much better than the five course lunches I had been treated to in the hotels I was putting up. It was another successful day with farmers but they could not release me without an assurance that they will see their photos in the Magazine. It was now my turn to be roasted as Jason and Victoria laughed to their last tooth.

I sat in the comfort of Jason's car, enjoying the music punctuated with on and off well picked shyly spoken words from Victoria. The car snaked passed the potato farms and natural forest. The rough murram roads made the car squeak and squawk. None of us knew the road well but the villagers we asked kept on encouraging us to drive on. It was a heavily travelled road; every time I looked ahead I saw groups of women with half sacks full on their head walking ahead. Back to Nakuru we parted our ways with only one assurance, no photos in your next issue, no enjoying another trip to Murinduko.

It was another day in a scribe's world.

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