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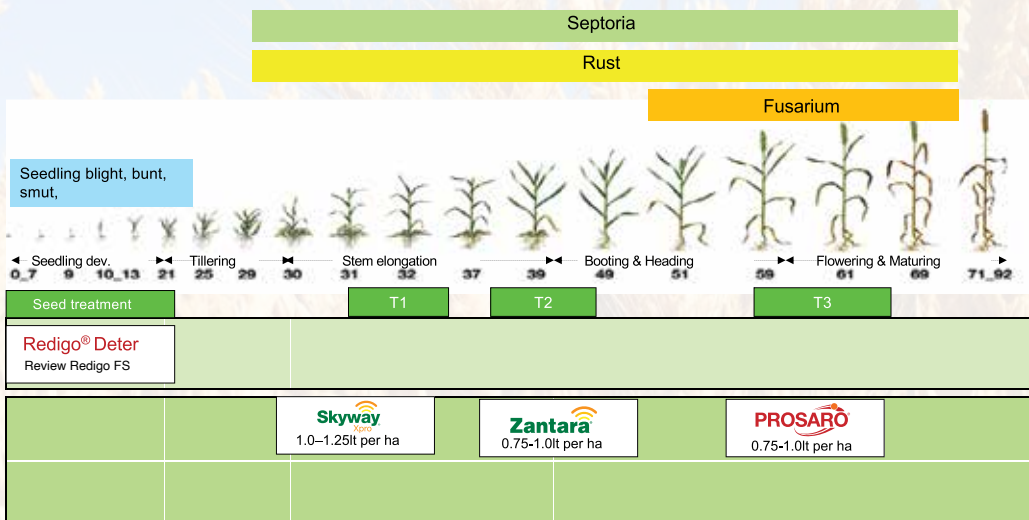


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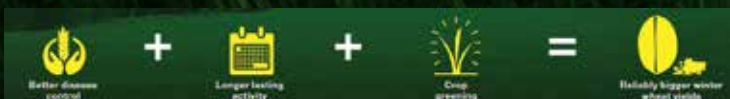
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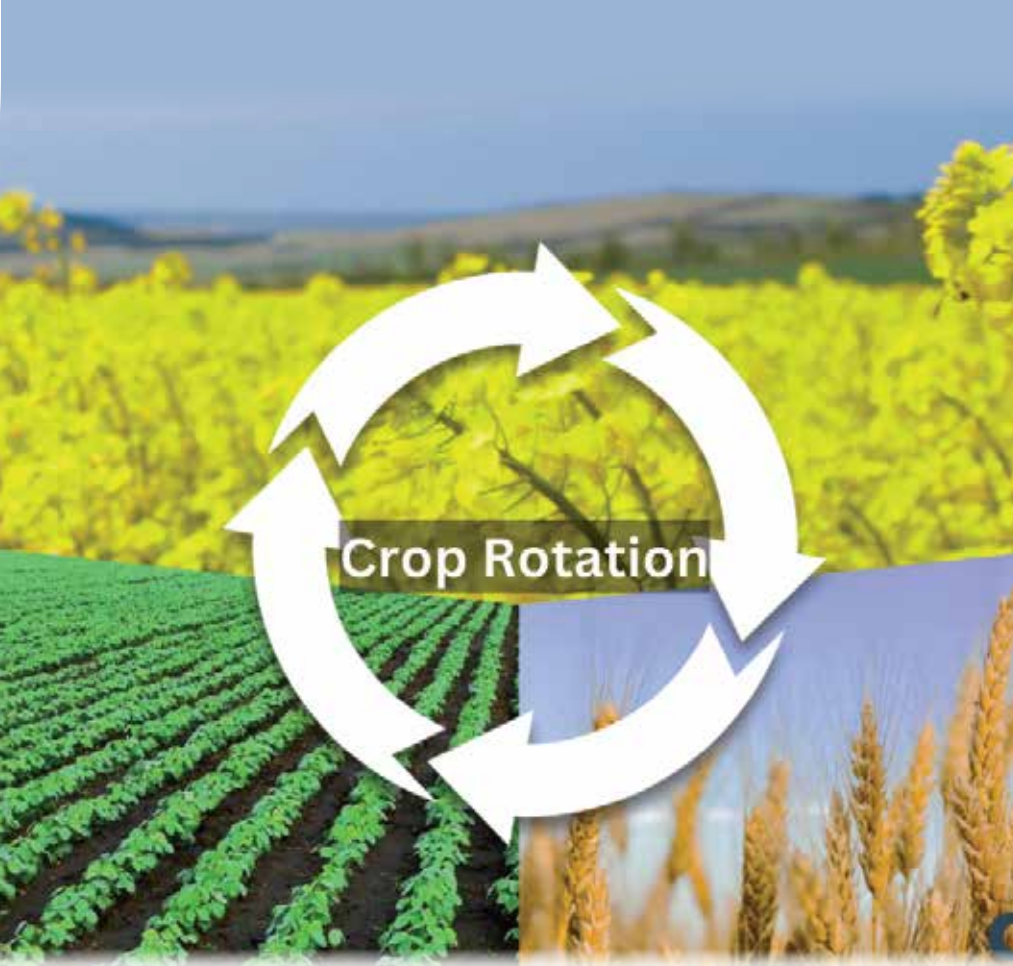
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Crop Rotation

The Simple Science Behind Crop Rotation

Crop rotation encourages the utilisation of various crop species, it assists in the build-up of soil organic matter, improves soil structure and the chemical and biological soil environment. Soil organic matter has additional advantage of improving water infiltration and retention, increased drought-tolerance and decreased soil erosion.

Cereals

April - June 2024

Editor

MASILA KANYINGI

Sub-Editor

MARY MWENDE MBITHI

Editorial Assistant

CORNELIUS MUEKE

Contributors

Thomas Kipkorir

Kelvin Wairimu

W. Edwards Deming

Aditi Mukherji

Photographer

ALEXANDER MAINGA

Graphics Designer

EVELYNE NDIEMA

Marketing

FLORINEWS LTD

Administration Assistant

CHRISTINE MUTHOKI

Editorial Board

NICHOLUS MBATHA - CORTEVA

JOSEPH KIOKO

MAINA NGUNJU - BAYER EAST AFRICA

MARTIN MWOBODIA - CONSULTANT

STAY CONNECTED TO CEREALS

TEL: 020-2440908 ,0732-558172,

EMAIL: info@cereals.co.ke

Website: www.cereals.co.ke



Transforming food systems

Transforming food systems around the world can lead to socio-economic benefits summing up to trillions of US dollars a year. The current food systems are destroying more value than they produce and thus an overhaul of food system policies is urgently needed. The costs of inaction to transform the broken food system will probably exceed the estimates in this assessment, given that the world continues to rapidly move along an extremely dangerous path.

Food systems can instead be a significant contributor to economies, and drive solutions to health and climate challenges. Better policies and practices could lead to eradication of malnutrition and cumulatively, millions of lives could be saved from premature deaths due to diet-related chronic diseases. Food systems could become net carbon sinks by 2040, helping to limit global warming to below 1.5 degrees by the end of the century, protecting an additional 1.4 billion hectares of land, almost halving nitrogen surplus from agriculture and reversing biodiversity loss.

Furthermore, 400 million farm workers across the globe could enjoy a sufficient income. The cost of achieving this transformation is small compared to the multi-trillion dollar benefits it could bring. Food systems are a uniquely powerful means of addressing global climate, nature and health emergencies at the same time – while offering a better life to millions of people.

Rather than mortgaging our future and building up mounting costs leading to high hidden health and environmental costs that we will have to pay down the line, policy-makers need to face the food system challenge head-on and make the changes which will reap huge short- and long-term benefits globally.

Masila Kanyingi
Editor

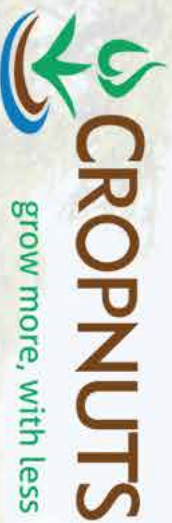
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 Mashiara Park, Kaptagat Rd, Off Waiyaki Way, Nrb


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Navigating the Path to a Bumper Crop

By Mary Mwende

Tackling the Production Gap

Rice consumption in Kenya is increasing at a remarkable rate. The annual production stands at 180,000 metric tons,

address this deficit lies in optimizing rice cultivation techniques. Seed selection and nursery preparation play a vital role in ensuring healthy seedlings for transplanting. By adhering to best practices in seed selection and viability testing, farmers can improve germination rates and overall crop yield. Additionally, integrating organic and inorganic nutrient sources through proper nutrient management enhances soil fertility and promotes sustainable yields. Practices such as combining inorganic fertilizers with organic sources like cattle manure or rice husk powder can provide rice plants with essential elements for healthy

if left unchecked. Implementing integrated pest management techniques, crop rotation, and timely interventions can help mitigate the impact of these threats, ensuring a healthy crop and improved yield.

Moreover, proper harvesting and post-



Rice Blast

harvest practices are essential for maintaining grain quality and reducing losses. Mechanical dryers and other post-harvest technologies can improve efficiency and preserve grain quality during transportation, thereby maximizing the value of the rice crop.

Confronting Bacterial Blight

Bacterial blight presents a challenge to rice

while national consumption reaches 949,000 metric tons. With a projected population growth rate of 2.7% per year, the estimated annual national demand for rice could soar to 1,290,000 tons by 2030 (National Rice Development Strategy-2, 2019-2030).

growth and development.

Managing Pests, Diseases, and Quality

Pest and disease management are critical components of successful rice cultivation. Common pests and diseases can devastate rice crops

cultivation in East Africa. This destructive disease, caused by *Xanthomonas oryzae* *pv.* *oryzae*, has been reported in key rice-growing regions, leading to substantial crop damage and economic losses.

One of the primary strategies to

Cultural controls, resistant cultivars, and vigilant field hygiene are essential for managing bacterial blight and ensuring sustainable rice production in the region.



Bacterial Blight

Taming the Threat of Wood Sorrels

Wood sorrels, also known as *oxalis*, are a group of flowering plants belonging to the *Oxalidaceae* family. Wood sorrels pose a silent threat to rice fields in East Africa, competing with rice crops for nutrients and space. Understanding the propagation methods of wood sorrels and implementing targeted weed management strategies are crucial for protecting rice fields from their encroachment. By arming themselves with knowledge and proactive interventions, farmers



can safeguard their harvests and preserve the prosperity of agricultural endeavors.

Nitrogen Management

Moreover, effective nitrogen management is essential for enhancing rice production. Nitrogen deficiency significantly impacts plant growth, grain yield, and quality, emphasizing the importance of proper fertilization practices. Collaborative efforts among experts and the dissemination of knowledge are essential for addressing nitrogen deficiency and promoting sustainable rice production practices in the region.

Battling Rodent Infestation

Rodent infestation is another significant issue affecting rice production. Rodents cause damage

throughout the cultivation process, from eating sown seeds during planting to attacking mature stems and stored grains. Cultural control methods, such as traps and predator utilization, are recommended for managing rodent populations and protecting rice crops. By implementing these management practices, farmers can mitigate the impact of rodent infestations and safeguard their harvest

The Mycotoxin Challenge

However, rice faces challenges beyond cultivation practices. Mycotoxin contamination poses risks to both public health and trade, highlighting the need for comprehensive management strategies. Pre-harvest measures, such as avoiding drought stress and eradicating insect pests, are crucial for preventing mycotoxin contamination. Similarly, post-harvest management practices, including proper drying and storage, play a vital role in ensuring the safety and quality of rice products. Compliance with international standards for mycotoxin levels is



Rice Rodent

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essential for trade and consumer safety, underscoring the importance of effective management practices.

Diversifying for Profit

Furthermore, there is great potential for product diversification in the rice industry. Value-added products from rice and rice by-products, such as rice husk briquettes and rice straw utilization, offer opportunities to create additional revenue streams for farmers.

By tapping into these resources, farmers can enhance the sustainability and profitability of their rice cultivation practices while contributing to environmental conservation efforts.

Collaborative Strategies and Transformative Initiatives

Partnerships for Progress in Rice Development

There are efforts to enhance rice production and resilience in Kenya through collaborative initiatives. These endeavors, supported by national or international partners are dedicated to developing improved rice varieties tailored, ensuring high grain quality, and fortifying tolerance against prevalent biotic and abiotic stresses.

There are also engagements in establishing and reinforcing multi-stakeholder platforms. These platforms serve as catalysts for disseminating and adopting improved rice varieties and modern agricultural practices.

Through robust partnerships with governmental bodies, non-governmental organizations, and

research centers as well as with donors and development agencies, they raise awareness of innovative technologies and bolster local rice production in both rain-fed and irrigated lowland ecosystems.

KALRO's Role in Transforming Kenya's Rice Sector



Dr. Eliud Kiplimo Kireger is the Director General/CEO of KALRO

The Kenya Agricultural and Livestock Research Organization (KALRO) plays a significant role in empowering farmers and improving rice seed production in the country. Through training

programs and the introduction of high-yielding climate-smart rice varieties.

KALRO aims to address the growing demand for rice in Kenya by equipping farmers with the necessary skills and knowledge. KALRO endeavors to increase domestic rice production and reduce reliance on imports, thus enhancing food security and stimulating economic growth.

In conclusion, enhancing rice cultivation in the region requires a multifaceted approach that addresses various challenges, including seed selection, nutrient management, pest control, and product diversification.

By implementing strategic practices and leveraging innovations in research and technology, farmers can increase yield, improve crop quality, and contribute to food security and economic development in the region. Collaboration among stakeholders, government support, and farmer empowerment are crucial for realizing the full potential of the rice industry.





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The Simple Science Behind Crop Rotation

My grandmother used to tell me that I am not supposed to plant the same crop on the same land consecutively. And when I asked her why not? Her reply would be it was not right. Well, that is where her understanding ended, but all she was telling me was to rotate crops to fight pests for more yields. Now, let's explore the benefits, rules and the science behind crop rotation.

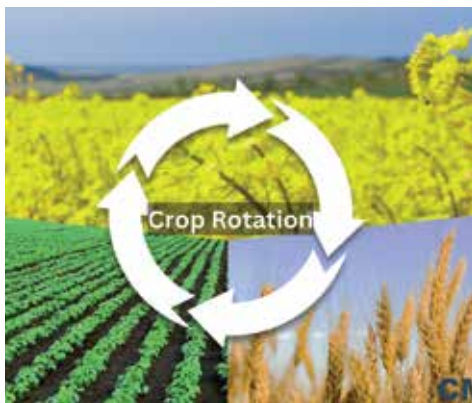
Why Rotate

The first rule is that crops of the same family should never be planted following each other because they share the same pests and diseases.

At the time of growing the first crop, there will be pest and diseases that will build up. Therefore, by the time you plant the second crop of the same family, the diseases and pest will be ready to attack it.

Weeds in most cases are not beneficial to the crop since they act as alternate hosts of both pests and diseases. This is apart from competing with crops for nutrients, space, sunlight and water.

The second rule is that in the sequence, there needs to be a legume. Leguminous crops e.g soya beans. The advantage of having soya beans in the sequence is that it fixes the atmospheric nitrogen into the soil through a process known as biological nitrogen fixation with the help of micro-organisms found in their roots known as rhizobia. This means the atmospheric nitrogen, which is in its



molecular form N_2 is converted to ammonia (NH_3).

The ammonia is then converted into ammonium (NH_4^+) which is the form that is utilised by the plant. After soya

beans are harvested, the amino acids in the crop are released back into the soil where they are converted into nitrate (NO_3^-), which is a form that is utilised by plants. You can rotate a cereal such as wheat with soya beans.

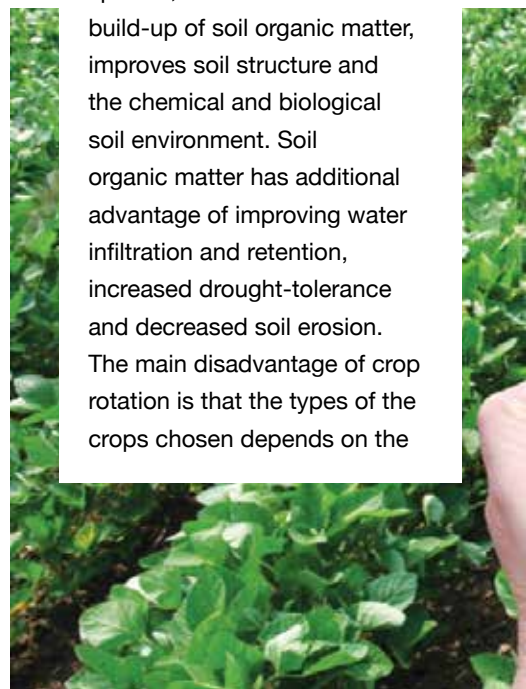
Furthermore, legumes are also called green manure. This is because of their ability to biologically fix nitrogen into the soil. For you to get the maximum out of green manure, you need to incorporate the legume into the soil. Green manure also has the advantage of improving the soil structure and the water-holding capacity of the soil.

The third rule of crop rotation is to rotate crops with different rooting depth. The deep-rooted crop should be rotated with the shallow-rooted. For example, sunflower (deep-rooted) should rotate with wheat (shallow-rooted).

Crop rotation keeps the farmer in production throughout the year. Although the planting seasons are determined by the amount of rainfall, a farmer should take advantage of this using a rotational sequence. Crop rotation further helps to reduce the amount of fertiliser used, especially if you incorporate legumes, thus cutting the cost of production and increasing the profit margins.

Though not proven, there is an increase in yields in a rotation sequence, which some agronomists term as the rotational effect. The growing of the different crops on the same piece of land in the same season also cushions the farmer from losses.

Crop rotation encourages the utilisation of various crop species, it assists in the build-up of soil organic matter, improves soil structure and the chemical and biological soil environment. Soil organic matter has additional advantage of improving water infiltration and retention, increased drought-tolerance and decreased soil erosion. The main disadvantage of crop rotation is that the types of the crops chosen depends on the



farmer's preference, which is influenced by the environment especially water availability and temperatures.

Income generation

Soya can become a staple food in Kenya. It's possible for each rural household with a piece of land to plant on at least an acre and produce more beans needed for annual consumption. Ordinary tools and materials are readily available in the will work.

Soya bean production is an income generation activity. You can generate more income with soya bean production than maize, cassava or bean production! At home you can use soya food products in a huge variety of recipes. You can prepare soya foods from home grown soya beans or buy them at a local market. That's pretty incredible! You can buy and sell soya products in a retail shops.

Agro-processing

Soybeans are grown for their oil and meal. Soybeans are crushed, the oil is extracted and the by-product is high-protein soybean meal. The oil has many uses including as an edible vegetable oil. The meal is used as a source

of protein in animal feed and primarily included in feed for poultry and fish. Less is used for beef, dairy, sheep or goats.

Seeds

So the key is to select varieties that are adapted to your day length, soil type and weather environment (rainy or dry or irrigated). KALRO have done a great job of breeding and selecting adapted and high-yielding varieties. Having the right variety of good quality seeds will make all the difference



Legumes are also called green manure. This is because of their ability to biologically fix nitrogen into the soil. For you to get the maximum out of green manure, you need to incorporate the legume into the soil. Green manure also has the advantage of improving the soil structure and the water-holding capacity of the soil.



Soya bean

on whether your venture is successful or not.

Other Rotational Defenders include;

Peas : one of the least consistent of all crops, combining peas requires a well-structured, level seedbed and a relatively dry start to avoid lush growth and to get ahead of *Ascochyta*. Being a large seed, they lend themselves to planting deep into stored moisture, allowing them to get a

head start on disease and earlier harvest.

Peas are very susceptible to *Ascochyta* in very wet seasons but do not be sucked into the hype around spraying multiple fungicides as these are rarely effective and on occasion do more damage to the crop. Aphids and Bollworm need watching closely so sprayer capacity is a must.

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Peas

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Chickpeas: A true dry season crop that thrives on stored moisture – not for cool environments when temperatures get into the single figures or where in crop rain is likely to be over 250mm. Many a great looking crop has disappointed at harvest having been full of Botrytis Grey Mould. Kabuli's tend to be the easiest crop to market and sell, and need planting at depth to ensure strong plants – great for moisture seeking if you are prepared to plant slowly. There is zero tolerance of Bollworm damage, so they need to be monitored closely.

Dry beans : Do well in most areas of Kenya, although I tend to see most disappointments come from choosing the wrong variety at higher altitudes and planting in high rainfall seasons.

More of an off-season, opportunistic crop dry

beans would appear to need a high level of phosphate fertiliser in the seedbed and consistently benefit from topdressing (something that is clear in other parts of the world too). Being very uncompetitive against weeds and requiring a large amount of labour to weed and hand harvest, when costed up properly I rarely see a dry bean crop that makes money.

Lupins: Tolerating both moderately wet and very dry conditions, lupins benefit from being inoculated with rhizobium more than any other legume; it is very distinct in the field when the inoculant is applied at sowing. The rhizobium strain for lupins is also the most acid

tolerant, handy for the vast majority of Kenya's soils!

White Lupins are relatively unique in that they are Mycorrhizal and Proteoid, allowing them to access a large amount of P from the soil; large savings in the short term at least can be had from not requiring seedbed fertiliser. Check the germination of seed before planting however as lupins are notorious for germination problems if not handled gently.

In conclusion, legumes are a crucial part of the crop rotation on many levels such as adding valuable soil nitrogen, reducing root diseases like Take-all and



Chickpeas



Lupins

Many legumes also reduce levels of damaging nematode species such as Root Lesion species. No wonder the best crops I look at have legumes in the rotation. It is hard to put a finger precisely on the benefit, but I can tell you that I have never visited a farm consistently achieving over 25 bags per acre without a rotation; 40 bags is reliable once some diversity is introduced in the form of pulses, sunflowers and canola.

Fusarium in cereals, improving soil structure and allowing control of grass weeds such as Brome and Ryegrass.

Something that I have seen first-hand over the last few years in Kenya is the effect that legumes have on improving phosphorus availability – I visited several farms where soil test P levels were around 5ppm of Phosphorus 10 years ago when they were mono-cropping maize or wheat and are now over 20ppm. This immediately translates into improved crops and big savings in cash and risk for the farmer.

In reality, when viewed in isolation legumes will not make the money that wheat or maize does. But then defenders in football rarely score goals; yet they are essential to win matches and ultimately trophies. So what are the pulse options, and how best to go about identifying a suitable crop to try out for 2024?

In Summary

- The first rule is that crops of the same family should never be planted following each other because they share the same pests and diseases
- Weeds in most cases are not beneficial to the crop since they act as alternate hosts of both pests and diseases
- The second rule is that in the sequence, there needs to be a legume which include the common bean, lentils, garden peas, soya beans, peanut/groundnuts, chickpeas, pigeon peas, cowpea and green grams and pastures such as alfafa, clover and lupin, among others.
- You can rotate a cereal such as maize with soya bean.
- Crop rotation further helps to reduce the amount of fertiliser used, especially if you incorporate legumes, thus cutting the cost of production and increasing the profit margins.

Managing Common Insect Pests in Cereal Farming

By Thomas Kipkorir

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

Scouting for insects.

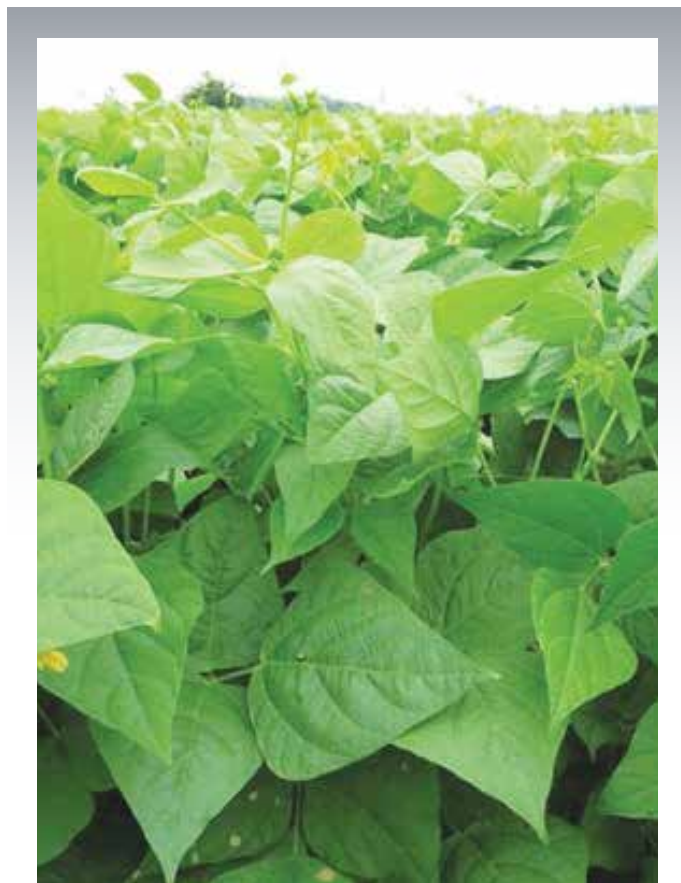
Depending on location and when the crop is planted, insect problems vary from non-existent to severe. Identifying the pest and understanding its potential for damage is necessary when selecting appropriate control methods. Each pest does not respond the same way to a given method.

Monitor fields at least twice per week. Walk a “V”

or “W” pattern through the field and select plants from 12 random locations along the pattern. When plants are still small (up to 10 leaves), examine 6 adjacent plants per location for insects and disease. As plants get larger sample 3 leaves per plant on 6 adjacent



Minute Pirate Bug feeding on whitefly nymphs



plants per location (total of 216 leaves).

Insects cause injury to the leaves, stems, roots, and fruit. The developmental stage of the plant at the time

of attack often governs which plant part different insect pests may injure. However, some insects feed specifically on one plant structure; others may feed on several structures. The first step in control is to identify the insect.

Certain cultural practices may have a dramatic effect on the potential for economic injury by certain insects. Planting during optimal growing conditions ensures rapid seedling emergence and subsequent growth. This reduces the amount of time that plants are susceptible to injury from seedling insect pests.

Most insect problems can be treated as needed if detected early, but no one insecticide will adequately control all the insects that may attack a crop. Scouting for insects is the most efficient way to determine what problems may exist and what action should be taken.

Preventive treatments may be necessary for certain insect pests. Preventive treatments are used against insects that are certain to cause economic

FROM PAGE 16

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FROM PAGE 15

injury if they are present. Field history, harvest dates and insect pressure in nearby production areas influence preventive measures decisions.

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

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

likelihood of secondary pest out breaks.

Resistance Management

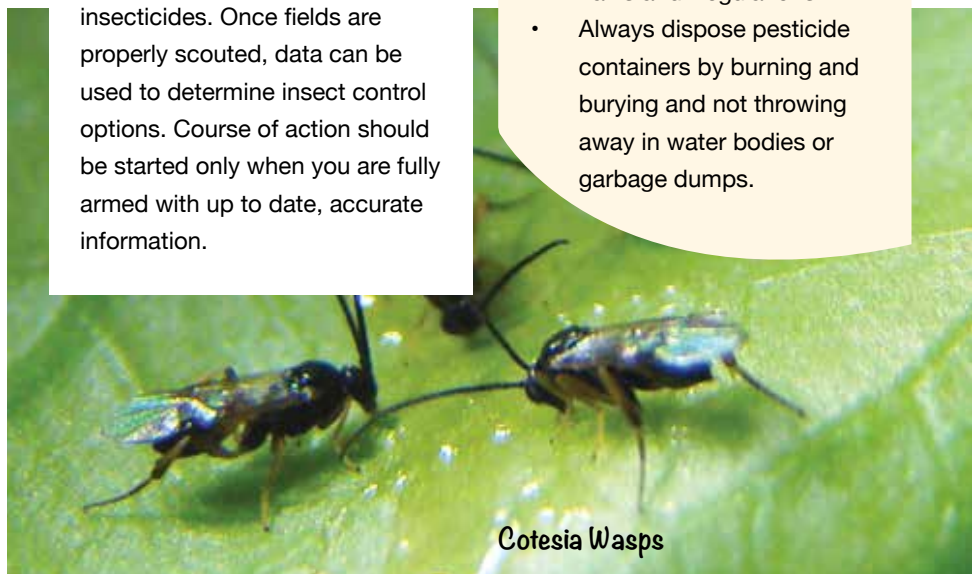
In a population of resistant insects, insecticide resistance levels to a particular class of insecticide increase each time that class of insecticide is used. Once a material is used, its level of effectiveness will likely be reduced against subsequent generations within the season.

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

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

Pesticide precautions

- Observe all directions, restrictions and precautions on pesticide labels. It is dangerous, wasteful and illegal to do otherwise.
- Store all pesticides in original containers with labels intact and behind locked doors. Keep pesticides out of reach of children.
- Use pesticides at correct label dosage and intervals to avoid illegal residues or injury to plants and animals.
- Apply pesticides carefully to avoid drift or contamination of non-target areas.
- Surplus pesticides and containers should be disposed of in accordance with label instructions so contamination of water and other hazards will not result.
- Follow directions on the pesticide label regarding restrictions as required by Laws and Regulations.
- Always dispose pesticide containers by burning and burying and not throwing away in water bodies or garbage dumps.



Leaf Tissue Analysis

Every time I attend a talk, watch a video, or read an article on crop nutrition, the moment I hear the words “Nutrient X is important for [pollen formation / photosynthesis / insert any other process in the plant]”, I switch off.

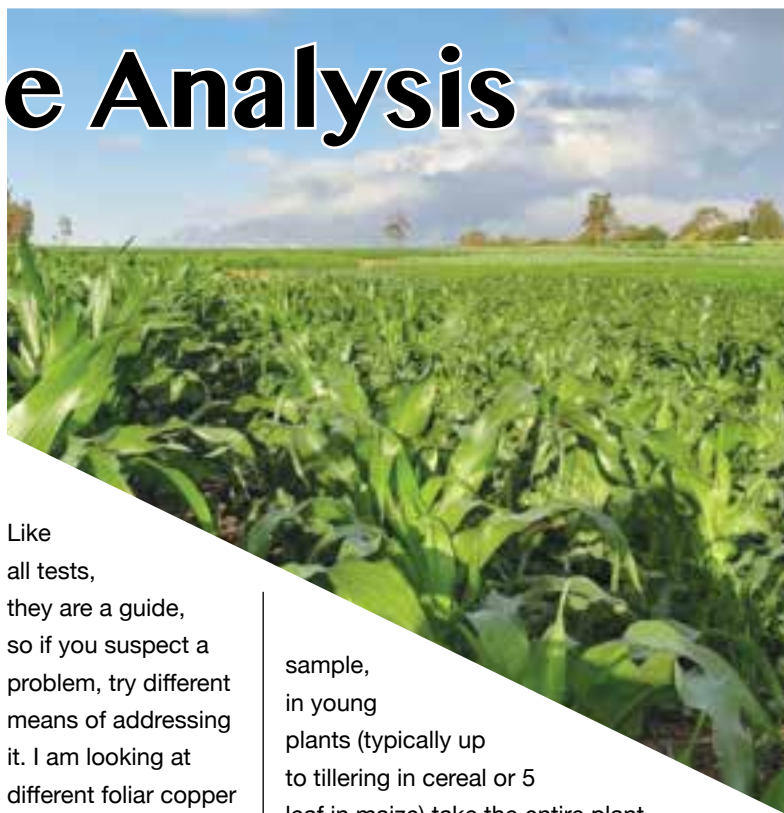
Whilst it is entirely true that different nutrients perform very different functions within the plant, it betrays a fundamental lack of understanding, or attempt, to identify and fix the problem.

What really matters is our ability to analyse and test for potential deficiencies, then set a course of action to correct them in order to protect crop yield and quality.

There are many ways of doing this; soil testing helps suggest that the crop MIGHT get hold of from the soil, visually looking at the crop tells us if we have a very serious problem that has already probably caused irreversible damage, Grain Nutrient Analysis tells us what nutrients actually made it into the crop in the end historically so cannot do anything about except in future crops.



This is why Leaf Tissue Analysis is very useful; it gives a snapshot, in the growing season of issues that are developing and may not be visible to the eye, before they become too serious.



Like all tests, they are a guide, so if you suspect a problem, try different means of addressing it. I am looking at different foliar copper products in cereals at the moment for example; I have tried dressing seed and fertiliser with copper but without success, I know that foliar copper products reliably increase yield on most of our soils from our

sample, in young plants (typically up to tillering in cereal or 5 leaf in maize) take the entire plant. Beyond this, take the newest emerged leaf. I also take leaf samples in maize during grain fill, from the leaf attached to the stalk directly below the cob.

Take at the same time of day – mid-morning if my preferred time, then I wrap them in a breathable paper bag and send them to a laboratory without delay. And make sure the sample is clean – no soil contamination or dirty hands. Once you get the leaf test result back,

“What really matters is our ability to analyse and test for potential deficiencies, then set a course of action to correct them in order to protect crop yield and quality.” these are some of my learnings over the years....

own trials, and I now seek to further my understanding of different timings and formulations to enhance this.

An example of a leaf analysis report
When you take a leaf

Nitrogen

Nitrogen can change very quickly. In reality, a healthy fast growing crop should often be slightly on the high side of the guideline high threshold, especially tillering cereals for example; a week later and they can be visually deficient in the field, from what was a perfectly adequate level on the leaf test.

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Phosphorus

Phosphorus deficiency is generally considered to be very reliably measured by a leaf test. Which is useful as it is often a limiting nutrient for us. A word of caution; in very deficient situations, P on a leaf test can be very high, even though the plant is visually purple and stunted. I am yet to receive a satisfactory explanation as to why this is so it remains an enigma to me.

Potassium

Perhaps less reliable nutrient in a leaf test. Sap analysis is the best way to check K status if you suspect a deficiency in a crop, although in most areas of Kenya this is unlikely.

Calcium

Having seen low calcium in leaf tests for many years and attempted to correct it with foliar sprays and lime etc, I have a suspicion that many guidelines are too high, especially for minor legume crops. If you leaf test is low, start trying things but do not be overly alarmed.

Magnesium

Magnesium thresholds are good, until you get cold and wet soils. Often a cereal crop will be well supplied, but will show up classic striping on the leaves in cold and wet weather. The leaf test shows that it is actually ok, so is a really useful guide. I see lots of samples from the slopes of Mt Kenya like this in May and November!

Sulphur

Sulphur can be very mobile around the plant, and I have often found that big applications will push up leaf sulphur levels in canola and cereals, but are not reflected in the final yield. Lots of leaf samples sit towards the lower end

of the guideline levels but are actually fine. In general sulphur leaf testing is not a great guide as to whether you are going to see a response in the crop unless it is very deficient, in which case you will see the classic yellow younger leaves. Sodium Of minor importance to most crops and rarely an issue.

Iron

Best tested via a sap test, if you suspect a problem

Manganese

Always worth checking on crops like peas. On high pH soils the crop will usually tell you if it is Mn deficient as it will be light green and floppy, except where the soil is firmer on tractor wheelings.

Boron

This has to be seriously low to cause problems in cereals. Occasionally I do see a response in trials of 0.3 t/ha or so, but unless levels in the plant are well below 2ppm, you don't have a problem.

Copper

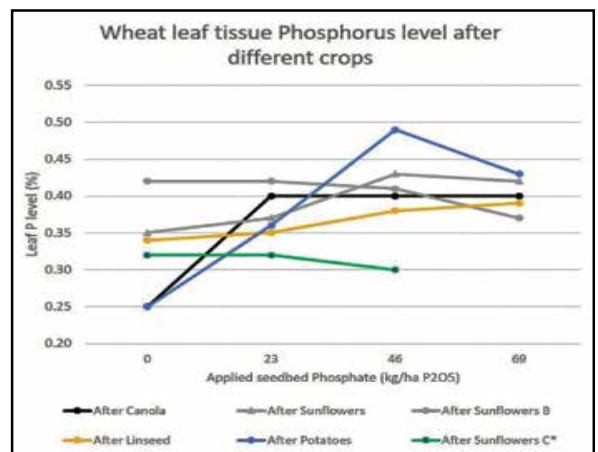
This goes up and down rapidly as the plant grows. In cereals it often drops from 15ppm after a foliar spray, down to 5ppm, so as long as you apply foliar little and often, you can afford to drop below the guideline low temporarily.

Molybdenum

More of an issue in pulses. I spent years trying to increase Molybdenum levels in the plant with foliar sprays, then tried seed dressing with just a few grams and it is far more effective!

Zinc

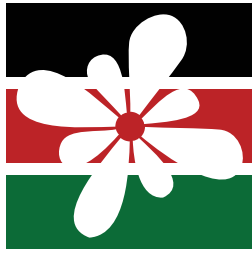
Rare to see very deficient plants, but if you are on the low side of a leaf test and the crop is struggling in any way, you can often see a response. It is one of the few elements where the guideline low could sometimes be set higher, especially in barley.



Above is a graph of leaf test Phosphorus in wheat, taken at late tillering, on soils where the Phosphorus level is below 15ppm. You can see how the leaf P increases in line with increased rates of phosphate fertiliser, and how different previous crops can affect the uptake of P (canola and heavily cultivated potatoes have minimal mycorrhizae for example. Sunflowers are highly mycorrhizal so even plants without P seedbed fertiliser are able to take up useful amounts of P).

Source

Think Agronomy is brought to you by Cropnuts and the Centre of Excellence for Crop Rotation. We share the same vision for sustainable, dryland farming across Africa, and Think Agronomy is our independent voice to promote profitable, climate-resilient farming through better management of soil health, systems-based agronomy, crop diversification, and farm mechanization.



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Benefits of Seed Treatment Before Planting



The beauty of seed treatment lies in its adaptability. Formulations can be customized based on the specific needs of different crops and the unique challenges presented by various regions.

Seed treatment before planting is a crucial practice that has gained widespread recognition for its multifaceted advantages in modern agriculture. As the foundation of any successful crop, seeds play a pivotal role in determining the overall yield and health of the plants they give rise to. Seed treatment involves the application of various technologies and treatments to seeds before they are sown in the field.

The benefits of seed treatment before planting

Enhanced Germination Rates

At the core of seed treatment lies the fundamental goal of optimizing germination rates. Seeds, the tiny vessels of life, carry the genetic blueprint for the entire plant. However, external factors such as pathogens and environmental stressors can impede the germination process.

Seed treatment involves the application of protective coatings and formulations that shield the seed from these impediments, ensuring a higher rate of successful germination.

Disease Prevention and Management

One of the primary challenges faced by farmers is the onslaught of seed-borne diseases. These diseases can significantly diminish crop yield and quality. Seed treatment acts as a preemptive strike against these pathogens,

employing fungicides and antimicrobial agents to create a protective shield around the seed. By mitigating the risk of diseases from the outset, farmers can reduce the need for extensive pesticide use later in the crop cycle.

Increased Plant Vigor

A healthy start sets the stage for a robust plant. Seed treatment not only protects seeds from diseases but also provides essential nutrients and growth stimulants. These treatments can include micronutrients, hormones, and bio-stimulants that invigorate the seed, fostering strong and resilient seedlings. As a result, treated seeds often give rise to plants with increased vigor, better equipped to withstand environmental stressors.

Improved Crop Uniformity

Uniformity in crop development is crucial for efficient farming practices.

Seed treatment contributes to the establishment of a more consistent stand by ensuring that each seed has a similar starting point. This uniformity in germination and early growth stages facilitates better crop management, simplifying tasks such as irrigation, fertilization, and pest control.

Optimized Nutrient Uptake

A seed's ability to absorb and utilize nutrients is pivotal for its development into a thriving plant. Seed treatment formulations can include components that enhance nutrient uptake efficiency. These may involve the application of micronutrients, enzymes, or mycorrhizal fungi that establish symbiotic relationships with the plant's roots, facilitating the absorption of nutrients from the soil.

Environmental Sustainability

As agriculture grapples with the challenges of sustainability, seed treatment emerges as a valuable ally. By reducing the need for excessive pesticide applications and promoting healthier plant growth,

treatment aligns with environmentally friendly farming practices. This approach not only safeguards the ecosystem but also contributes to the long-term viability of agricultural systems.

Economic Benefits for Farmers

While the initial cost of seed treatment may raise eyebrows, the long-term economic benefits are substantial. By minimizing crop losses due to diseases and optimizing yield, farmers can realize a significant return on investment. Moreover, the enhanced efficiency in resource utilization and reduced dependency on external inputs contribute to overall cost-effectiveness.

Adaptation to Challenging Environments

Climate change brings about unpredictable weather patterns and increased stress on crops. Seed treatment can play a pivotal role in helping plants adapt to these challenges. Coatings that protect against drought or enhance resistance to extreme temperatures are becoming increasingly prevalent in seed treatment formulations, allowing crops to thrive in diverse and challenging environments.

Customization for Specific Crops and Regions

The beauty of seed treatment lies in its adaptability. Formulations can be customized based on the specific needs of different crops and the unique challenges presented by

various regions. This tailored approach ensures that farmers can address the specific issues relevant to their crops and geographic locations, maximizing the efficacy of seed treatment practices.

Technological Advancements in Seed Coatings

In recent years, technological advancements have propelled seed treatment to new heights. Precision application methods, nanotechnology, and the development of smart coatings are transforming seed treatment into a highly sophisticated science. These innovations not only enhance the effectiveness of seed treatment but also contribute to the sustainable and responsible use of resources in agriculture.



Therefore, seed treatment before planting is a dynamic and evolving practice that holds immense promise for the future of agriculture. From protecting seeds against diseases to enhancing nutrient uptake and promoting environmental sustainability, the benefits of seed treatment are far-reaching. As technology continues to advance and our understanding of plant biology deepens, the potential for unlocking even greater benefits from seed treatment becomes increasingly apparent. Farmers, armed with this knowledge, can harness the power of seed treatment to sow the seeds of a more resilient, productive, and sustainable agricultural future.

Own or Lease?

Farmers should buy a share in the cooperative and then pay an annual membership fee. Each member of the cooperative registers the equipment (if any) they are willing to hire on a central database.

Plant and machinery ownership makes up the second largest category of farm assets for crop production. Globally it has a number of differences in operating structures around the world.

Machinery hire versus ownership

It could be cheaper to rent large machines like tractors and harvesters from machinery dealers. Similarly, there should be a greater capacity within the contracting industry when it comes to operations like seeding, spraying and harvesting.

Some of the advantages cited from these arrangements included:

Access to a reliable machine with the latest technology

A known/defined cost to the business compared to the unpredictable nature of repairs and depreciation.

Better matching of capacity to demand

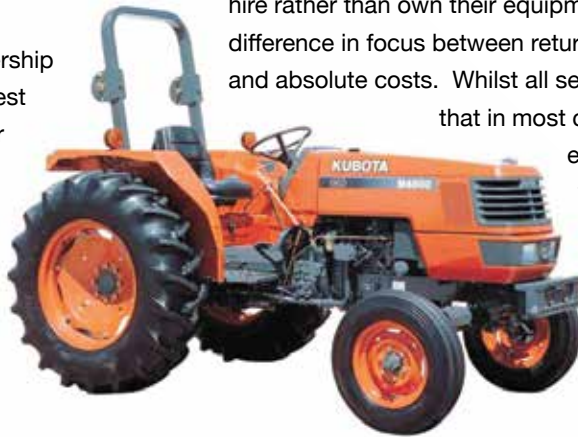
For example being able to call on a number of spray units to complete a job when the timing window is narrow. (This is obviously contingent on being a valued customer of a large contracting business).

Preserving capital for other investments offering better returns

Not all farmers take this approach, with some choosing to own equipment. The motive behind this decision is that an "owner operator" approach means capturing

all of the profit in the production system within the business. However, any surplus capacity is utilised by doing contract work for other farmers in order to maximise the return from the investment in plant.

Ultimately the difference between those who hire rather than own their equipment is a difference in focus between return on capital and absolute costs. Whilst all seem to agree that in most cases owning



equipment would be cheaper, it didn't always provide the best return on

capital. For example, a farmer can choose to hire his machinery in order to free up capital to invest in grain and fertiliser storage facilities which provided better returns for his business.

Machinery cooperatives

The concept of machinery cooperatives originated in Europe and there are now a number of such cooperatives running. These cooperatives allow members to reduce the cost of their machinery operations by either sourcing or offering machines from or to other members on a contract basis. The co-operative acts as an intermediary to facilitate the hiring of machinery between businesses. Farmers buy a share in the cooperative and then pay an annual membership fee. Each member of the cooperative registers the equipment (if any) they are willing to hire on a central database.

Members are then able to contact the ring to request hire of a machine or a contract service. The database is searched and the most compatible provider (based on location and costs) is put in contact with the farmer. The ring can charge a commission to both

parties for managing the paperwork and ensuring payment via the ring's direct debit payment system.

The general overcapacity of plant means there is usually an adequate supply of machinery to meet demand in a timely manner. Quite often farmers hiring their own machinery also provide an operator to ensure their equipment is well looked after. The co-operatives can also facilitate the sharing of labour between member businesses but take steps to ensure it is not viewed as an employer due to the complications this would cause with labour laws.

Co-operatives can also diversify into acting as a buying group to supply cheaper bulk inputs to members. They can broker the purchase of fuel for its members. It can also broker fertiliser deals. The successful operation of a buying group is contingent upon details of the deal remaining confidential within the group.

Individual members need to trust the system and cannot break out of the group within the year in order to chase a spot price.



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Insights From the Africa Agri Expo 2024

By Mary Mwende

The 7th edition of the Africa Agri Expo (AAE) in 2024 marked a significant milestone in the journey to harness Africa's agricultural potential amidst challenges. Despite facing setbacks such as climate change-induced droughts and erratic rainfall patterns leading to dwindling agricultural output, Africa remains a beacon of hope with over 50% of the world's fertile and untapped land. Projections suggest that Africa's agribusiness could skyrocket to a staggering \$1 trillion by 2030, provided the continent embraces innovations and advancements in irrigation, agri-technology, machinery, agrochemicals, and sustainable solutions.

Organized by the TAB Group, a global strategic consulting firm, in collaboration with the Ministry of Agriculture & Livestock Development and various stakeholders, the AAE 2024 held at the Sarit Expo Centre in Nairobi, Kenya, showcased Africa's rich agricultural landscape and presented a myriad of opportunities for local and international companies to explore and invest in the continent's burgeoning agribusiness sector.

Under the theme, 'Your Gateway to Agribusiness in Africa,' the event

served as a platform to spotlight technological advancements across the agriculture value chain, address food security and nutrition challenges, promote crop protection, efficient water management, and tackle post-harvest losses. With a focus on fostering networking opportunities, the expo brought together key players including agricultural companies, machinery and

equipment manufacturers, technology firms, agrochemical producers, and other stakeholders to forge strategic partnerships and collaborations.

The event, spearheaded by TAB Group CEO Tahir Bari, featured an expansive exhibition space, strategic conferences and panel discussions, aimed at showcasing the latest products, services, and innovations towards enhancing the agricultural sector's



Senior Deputy Secretary Ministry of Agriculture and Livestock Development, Badu Katelo, Youth farmer and climate change champion Ms. Charlene Ruto, Miss Tourism Kenya among other guests during the official opening of the 7th Africa Agri-Expo in Nairobi



Senior Deputy Secretary Ministry of Agriculture and Livestock Development, Kenya, Badu Katelo, presenting inaugural speech on behalf of C.S. Mithika Linturi

efficiency and productivity.

With participation from over 35 countries worldwide, AAE 2024 boasted a diverse lineup of speakers, exhibitors, and sponsors, including industry giants like Sorghum United, OCP Africa, and National Storage Solutions Pvt. Ltd., among others. Concurrently, the conference sessions delved into critical topics such as technology integration, sustainable farming practices, financing opportunities, and investment prospects in Africa's agricultural landscape.

During the inaugural launch, Cabinet Secretary for Agriculture and Livestock Development,

role of youth and women in driving agricultural transformation. Ms. Charlene Ruto, a youth farmer, and a climate change champion, emphasized the need to empower the youth and women in agriculture through education, training, and access to technology. She underscored the crucial role of young people as catalysts for positive change and innovation in the agricultural sector.

in irrigation, particularly through public-private partnerships, while John Macharia, Country Director of AGRA, emphasized the importance of building resilience among farmers and integrating climate-proof strategies into national agricultural budgets.

Precision agriculture emerged as topics of interest at the expo, with speakers advocating for a data-driven approach to farm management to boost productivity, profitability, and sustainability. Technologies such as satellite imagery, field mapping, and drone technology were showcased as tools to enhance crop quality, reduce environmental impact, and optimize resource utilization.

Addressing environmental concerns, speakers stressed the importance of reducing pesticide use and adopting eco-friendly farming practices. Topics such as technology integration, public-private partnerships, mechanization, and sustainable agri-food supply chain transformations were also explored, reflecting the diverse array of challenges and opportunities facing Africa's agricultural sector.



Eng. Charles Muasya, National Irrigation Authority's CEO among other attendees of the 7th Africa Agri-Expo

Mithika Linturi, in a speech read by Senior Deputy Secretary, Department of Agriculture, Badu Katelo, on his behalf, emphasized the expo's role in exploring untapped opportunities, innovative solutions, and sustainable practices to revolutionize Africa's agricultural sector.

Aligning with the government's priorities on food security, manufacturing, and value addition, the expo aimed to generate significant economic value, with a focus on empowering micro, small, and medium enterprises (MSMEs) within the agro-processing sector. Notably, the event also highlighted the crucial

Bridget Okumu, Country Director of the International Fertilizer Development Center (IFDC), reiterated Africa's immense agribusiness potential and called for greater investment in innovative technologies to improve farming practices and enhance food production systems. Eng. Charles Muasya, CEO of the National Irrigation Authority, highlighted investment opportunities

In essence, the success of AAE 2024 underscored the significance of collaboration, knowledge sharing, and innovation in driving agricultural development and economic growth across the continent. By harnessing Africa's agricultural potential and embracing technological advancements, stakeholders remain poised to unlock new opportunities, transform livelihoods, and secure a sustainable future for generations to come.



Attendees of the ESG Workshop keenly listening to the speakers of the day

Exploring the Role of



Writes Mary Mwende

In a bid to foster sustainable practices within the agriculture sector, the Agriculture Sector Network (ASNET) recently joined forces with the German development agency, GIZ, to host a workshop at a Nairobi Hotel. The focus of the workshop was on Environmental, Social, and Governance (ESG) principles and their vital role in advancing the sustainability agenda within the agricultural landscape.

ESG has emerged as a critical framework for evaluating the sustainability and societal impact of businesses across various industries. However, its application within the agriculture sector is still relatively nascent. Recognizing this gap, ASNET and GIZ took the initiative to educate stakeholders and industry players on the significance of integrating ESG principles into agricultural practices.

The workshop provided a platform for robust discussions and knowledge exchange among participants, comprising farmers, policymakers, researchers, industry experts, and representatives from various agricultural organizations. Through interactive sessions and presentations, attendees gained insights into how ESG factors can be leveraged to drive positive change within the sector.

One of the key highlights of the workshop was the emphasis on the environmental aspect of ESG. Participants delved into topics such as sustainable land management, water conservation, biodiversity preservation, and climate-smart agriculture techniques. The discussions underscored the importance of adopting practices that minimize environmental degradation while enhancing productivity and resilience in the face of climate change challenges.

Moreover, the workshop shed light on the social dimension of ESG, emphasizing the significance of promoting equitable and inclusive agricultural systems. Issues such as fair labor practices, community engagement, gender equality, and access to education and healthcare for rural populations were addressed. Participants explored strategies to ensure that agricultural activities contribute to poverty alleviation and foster socio-economic development within local communities.

The governance component of ESG was also thoroughly examined during the workshop. Participants discussed the importance of transparent and accountable governance structures within agricultural enterprises and organizations. Topics such as corporate ethics, risk management, regulatory compliance, and stakeholder engagement were deliberated upon, with a focus on promoting integrity



Dr. Agatha Thuo, GM, ASNET

and responsible decision-making at all levels of the agricultural value chain. As the workshop concluded, it was evident that integrating ESG considerations into agricultural practices is not only essential for mitigating risks and enhancing resilience but also for unlocking new opportunities for sustainable growth and innovation. Moving forward, ASNET and GIZ reaffirmed their commitment

to continuing such initiatives, recognizing the need for ongoing education and capacity building within the sector.

In conclusion, the ASNET-GIZ workshop served as a catalyst for advancing the adoption of ESG principles within the agriculture sector. By fostering collaboration, knowledge sharing, and collective action, stakeholders are better equipped to address the complex challenges facing agriculture while working towards a more sustainable and resilient future.

As the journey towards sustainability in agriculture continues, initiatives like these will play a major role in shaping the trajectory of the industry, ensuring that it remains not only economically viable but also environmentally sound and socially responsible.



Ms. Eddah Otieno of GIZ giving remarks during the workshop

Revolutionizing Regional Trade Dynamics

By Mary Mwende

In a bid to foster regional economic resilience and enhance the competitiveness of staple food value chains, the Eastern Africa Grain Council (EAGC) and Trademark Africa (TMA) in collaboration with the United States Agency for International Development (USAID) recently joined hands to launch a transformative three-year project aimed at revolutionizing grain trade dynamics across East Africa's key corridors.



The project, funded under the USAID Economic Recovery and Reform Activity (ERRA) program, promises to reshape the trade corridors of Uganda, Tanzania, and Kenya, thereby catalyzing economic growth and fostering food security.

Speaking during the launch, Mr. Gerald Masila, the Executive Director of EAGC, emphasized on the significance of collaborative efforts in addressing the complex dynamics of the grain trade. Masila highlighted the importance of structured grain trade in East Africa and underscored the pivotal role it plays in driving economic development and regional integration.

Additionally, he highlighted the expected benefits of the project to the sector including improved production, greater access to agricultural finance, capacity enhancement, SPS mentorship, quality compliance and better trade linkages.

The insights underscored the need for concerted efforts to address market inefficiencies, streamline regulatory

frameworks, and enhance value chain coordination to unlock the full potential of East Africa's grain trade.

Mathews Wanjala, Senior Programs Manager at Trademark Africa, provided an overview of the Economic Recovery and Reform Activity (ERRA) project, shedding light on its significance in revitalizing trade corridors across East Africa. With a focus on promoting economic resilience, Wanjala outlined the project's strategic approach towards addressing trade challenges and fostering sustainable growth.

Penina Gichuru, Regional Manager, Monitoring and Evaluation at EAGC, highlighted it's key strategy as strengthening the competitiveness of export-oriented staple food value chains. The project aims to equip stakeholders with the necessary tools and knowledge to thrive in the competitive global marketplace.

The launch of the project, symbolized a significant milestone in the journey towards enhancing East Africa's grain trade competitiveness. The project intends to strengthen farmer-led grain

trade business hubs utilization of technology to elevate grain production, enhance enterprise-level capabilities along with institutional frameworks to improve adherence to SPS standards, thereby bolstering export-driven grain trade. With a robust agenda and a collaborative spirit, the initiative set the stage for tangible progress and transformation in the region's agricultural sector. Attendees expressed optimism about the project's potential to catalyze transformative change, foster regional cooperation, and unlock new avenues for inclusive growth.

As East Africa cruises through the complexities of a rapidly evolving global trade landscape, initiatives such as these serve as beacons of hope, offering pragmatic solutions to address pressing challenges and harness the region's immense agricultural potential. The collaborative efforts of EAGC, TMA, and USAID underscore the power of partnerships in driving sustainable development and building resilient economies.

In the wake of the conference, stakeholders are poised to embark on a journey of collective action, leveraging the insights and strategies unveiled to chart a course towards a more prosperous and food-secure future for East Africa. With determination and collaboration, the vision of a vibrant and competitive grain trade ecosystem in the region draws ever closer to realization.



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The New Silage Making Process in Kenya

By Kelvin Wairimu

The practice of silage preparation is a skill that most farmers have mastered to conserve excess fodder and increase milk production.

Silage is an essential component in the diet of dairy cows, and well-preserved silage is a hallmark of successful dairy farming. After a period of 21 days, the preserved silage is ready for feeding and can last for two years or more.

High-quality maize silage, with a crude protein content of 18%, can significantly enhance milk production in dairy cows when provided as a supplement to other fodders and concentrates.

The quantity of silage fed per cow is dependent on milk production, with cows producing more milk fed with more silage to improve their milk yield. Research indicates that feeding cows with silage in the first lactating stage increases milk production by up to 10%.

However, improper silage-making processes can lead to rotten silage full of aflatoxins, which pose significant health risks to both animals and humans.

Elevated levels of aflatoxin exposure have been associated with health concerns such as delayed heat, bloating, miscarriages, and decreased milk production. It is, therefore, essential to understand

these risks and take the necessary measures to ensure the safety of both animals and humans.

What is silage-making?
Silage-making is the process of fermenting chopped crop residues with high moisture content under aerobic conditions to produce a special fodder known as silage.

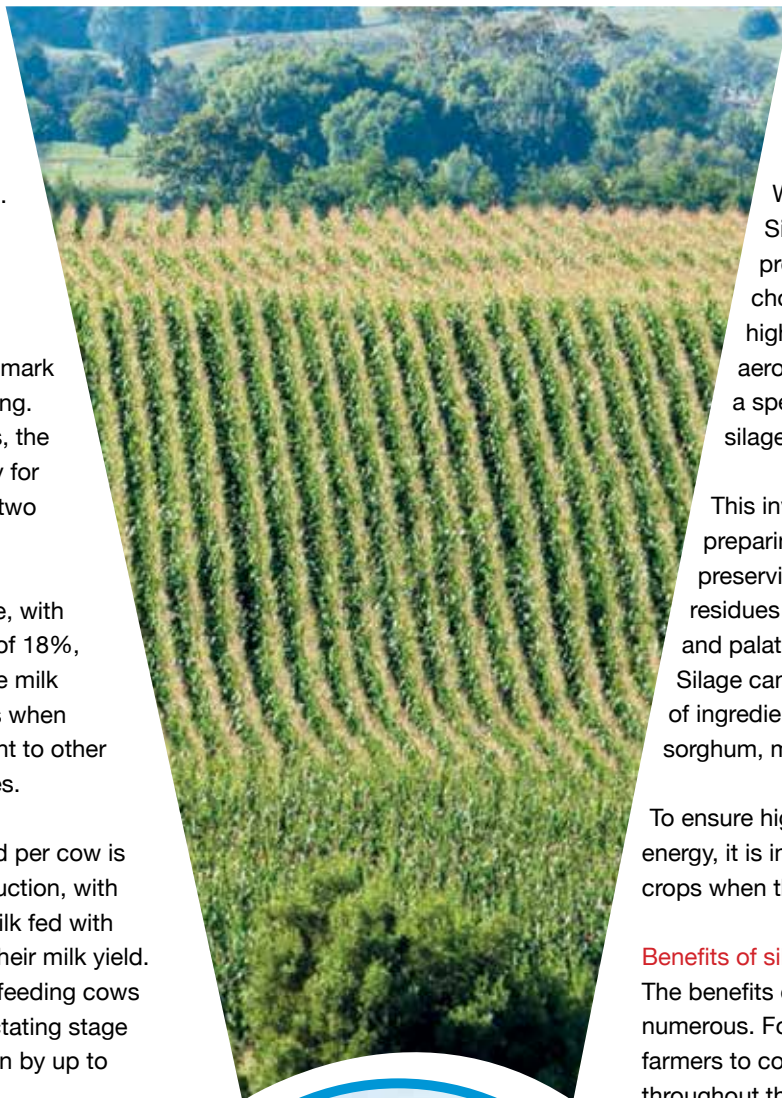
This involves the art of preparing, fermenting, and preserving chopped cropped residues to form a highly nutritious and palatable feed for cattle. Silage can be made from a variety of ingredients such as maize, sorghum, millet, and sunflower.

To ensure high crude protein and energy, it is important to chop the crops when they are mature and moist.

Benefits of silage making

The benefits of silage-making are numerous. For instance, it enables farmers to conserve green fodder throughout the year without losing nutrients.

Additionally, it reduces labour by mechanizing the silage-making process, particularly in fodder harvesting. Silage-making also requires less space than hay-making, making it ideal for small-scale farmers.



Silage making in Kenya

Silage-making has been adopted by dairy farmers in Kenya, particularly in the highlands, as a way of conserving excess fodder after the 2007 drought.

SNV has played a key role in promoting silage-making by engaging dairy farmers through training and demonstrations.

Initially, maize silage was the main crop used, but this later changed to fast-growing crops like sorghum and millet.

Today, silage-making has been commercialized, and farmers can purchase ready-to-feed silage.

Silage making bags\

Silage bags are a convenient storage option for silage-making.

These UV-treated, airtight polythene bags come in two colours: white and black. The white type with a black lining is ideal for outdoor storage, as it is made white on the outside to reflect excess heat and black on the inside to keep it warm. Most white silage bags are 1.5 M X 1 M and can hold up to 360 kg. Silage bags for indoor storage are black on both the inside and outside, enabling them to absorb and retain heat. Most outdoor silage bags are 1 m by 1 m and can hold over 200 kg of silage.

Silage making process

The silage-making process has five major steps that are the same, regardless of the storage method. These include harvesting the forage when it is mature and has at least 30% dry matter, chopping the forage into 1-3cm lengths, adding fermentable

unsatisfactory, it is important to determine the reason so that you can avoid it next season.

Why maize silage?

As Pioneer® brand

customers, farmers reading this article are likely to be well aware some of the many benefits of feeding maize silage to their herd.

However, farmers

decide to feed or grow maize for different reasons, and they may be surprised to learn that maize silage can also benefit other aspects of their farm business outside of how they have traditionally used it.

substrates such as molasses or livestock microbes, mixing and compressing in an airtight container, and keeping an airtight seal until you are ready to feed it. If the silage is



Implications of Collecting Data on Farm

“Without data, you’re just another person with an opinion.”

By W. Edwards Deming

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

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

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

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

A new revolution requires new ways of thinking and new approaches to some old problems in order to prosper as a farmer on a data-driven farm. What new approaches, what new ways of thinking do those of us



on agriculture’s front line need in order to adapt our mechanised industrial agriculture into the new reality of the information age?

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

Collecting data on farm has transformed from an expensive and laborious process that few farmers could be bothered with, to

one that is relatively cheap and increasingly easy. Rather than being a one-off process, collecting, analysing and continually reviewing data can become a system for ongoing improvement on a farm.

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

Collecting

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



Processing

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

Interpreting

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

Application

This is the step that makes the previous steps worthwhile. With a newfound understanding of what is happening on farm and some quantification of the issue being investigated, a farmer now has the confidence to change management decisions based on the interpreted data. Making better and more informed decisions on farm is what justifies the expense and time required to capture better farm data.

But has the implemented management change had the desired effect? There is now a need to collect data relating to the different farming or management technique to verify that improvements are definitely being made. So the cycle of collecting, processing, interpreting and applying data based decisions is an ongoing one. Each time this cycle is attempted, a farmer learns something more about their operations and



how to improve what they do.

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

Conclusion

Once accurate data is being collected at the farm level, such data can be aggregated and compared across different businesses,

regions, and countries. Farmers can use this aggregated data to analyse farm business performance. The promise of this is the potential for real-time business benchmarking. Third parties, including well known agribusiness multinationals are becoming interested in farm data at this aggregated stage, because it gives insights into how farmers are using various products. This leads to a strange phenomenon where a company's clients are also doing their product research.

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

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

Cooking Oils: Time to make the Right Choice

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

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



Canola Cooking Oil

attack and stroke. Canola oil is one of the healthiest vegetable oils available to consumers. Fats, like canola oil

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.

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:

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.



Canola Seeds

“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

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

How to Cut Agriculture's Emissions to Achieve a Just Transition

By Aditi Mukherji

According to the Intergovernmental Panel on Climate Change (IPCC), agriculture, forestry, and land use contribute 22% of global greenhouse gas emissions. Taking into account broader food systems, which include processing, transport, and consumer behaviour in addition to food production, the sector accounts for up to one third of total emissions.

The evidence is clear: without emissions reductions in the agriculture and food sectors, the world cannot achieve the 1.5°C warming goals in the Paris Agreement.

What is less straightforward is how to reduce agricultural emissions without further widening existing inequalities that mean smallholder farmers are most likely to be poor, hungry and malnourished.

Emerging literature shows that adopting the most ambitious measures to reduce agricultural emissions could compromise food security and increase hunger due to food price increases, particularly in sub-Saharan

Africa and South Asia.

These regions have the bulk of smallholder producers, who are highly vulnerable to the impacts of climate change, in addition to the nearly 700 million people who are already severely malnourished.

This puts us in a bind: we must bring down emissions in the agriculture sector, but doing so without due caution risks making some of the most vulnerable smallholder producers and consumers in the world even more vulnerable. This would be in direct contravention of the Paris Agreement.

The key question at the heart of the climate change debate today is therefore: how do we mitigate emissions in the agriculture sector without compromising the lives and livelihoods of small-scale producers in the Global South? This conundrum is central to the growing debate around a “just transition” to net zero.

No easy solutions, but a menu of

options

In some sectors, climate technologies and solutions are readily available and widely applicable, for example, decarbonizing electricity grids through clean energy, or electric vehicles in the transport sector.

But the agriculture sector presents a complex landscape of different production systems, different consumer preferences and different food processing and transportation networks, with varying degrees of food loss and waste across entire value chains.

This complex landscape means solutions must be context-specific, and require careful consideration of trade-offs and mutual benefits before and during implementation. Despite such complexity, research provides a menu of good, interconnected options for reducing emissions within food systems. These include halting deforestation, shifting to sustainable, healthy diets, reducing

food loss and waste, and improving crop yields.

Halting deforestation is a win-win option for emissions reductions, biodiversity conservation, and protecting the livelihoods of Indigenous peoples. But while more than 100 countries pledged to halt deforestation by 2030, recent numbers show that deforestation has surged.

Much of this deforestation is for producing food, mostly beef. Shifting to healthier plant-based options in high-income nations where meat consumption is unsustainably high can potentially help cut annual agricultural production emissions by 61% while storing more carbon.

Increasing crop and animal productivity while reducing food loss and waste can also bridge the nutritional gap, result in 42% fewer emissions compared to business-as-usual production patterns. This also reduces deforestation, showing that win-win actions in this sector are still possible. CGIAR, the world's largest publicly-funded agricultural research partnership, has played a crucial role in improving crop yields for the last 50 years across the Global South. Without improved yields, global deforestation for growing food would have been much higher.

Net-zero agriculture, but trade-offs must be addressed

Some studies show that achieving net-zero emissions in food systems by 2050 is feasible. But solutions must be contextualised and smallholder producers adequately supported to prevent trade-offs between food security among smallholder producers and emissions reductions.

For example, targeted interventions at the farm and production levels can decrease emissions from synthetic nitrogen fertilisers by up to 84% by 2050, provided smallholder farmers receive adequate training and finance. Similarly, a study by CGIAR scientists shows that full adoption of the most effective strategies to mitigate methane emissions from ruminant livestock can help keep within 1.5°C targets by 2030. Agroecological approaches can further reduce emissions by increasing soil carbon storage.

Finally, investing in emerging technologies that are expected to mature and become cost-effective in the coming years, such as green ammonia and nano-fertilisers, and deploying digital services such as precision agriculture technologies, remote sensing, and data-driven decision-making tools can also help reduce emissions in agriculture.

It is clear, then, that achieving our climate goals will require substantial and targeted investments into transforming food systems, particularly in low- and middle-income countries (LMICs).

While high-income countries and industrialised production systems must prioritise emissions reductions and dietary shifts, low- and middle-income countries urgently need investment into climate technologies, capacity building, and finance support to move to low emissions pathways.

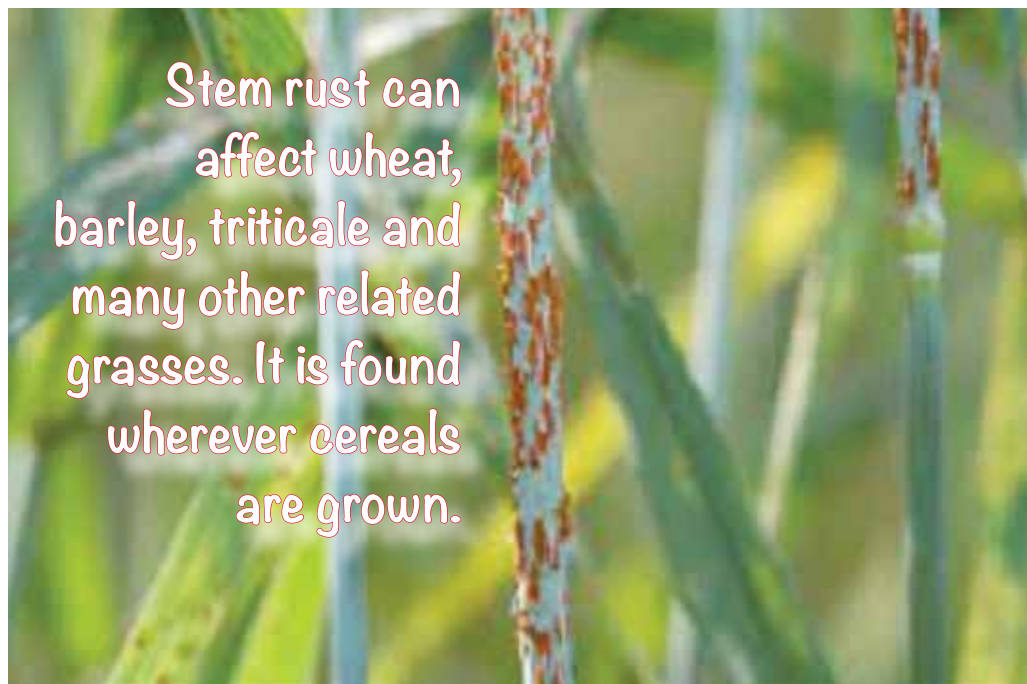
By embracing these strategies, we can mitigate emissions in agriculture, promote food security, and empower small-scale producers to ensure a more resilient future for us all.

*Any views expressed in this opinion piece are those of the author and not of the **Cereals Magazine**.*

Aditi Mukherji is Director, Climate Change Adaptation and Mitigation Impact Area Platform, CGIAR

SOURCE: <https://www.context.news>

Detect Early, Save Your Cash



Stem rust can affect wheat, barley, triticale and many other related grasses. It is found wherever cereals are grown.



Cereal diseases are a big challenge to the farmers, so they ought to be keen on their farm so as to know the progress of their crops and in case of any disease, how they should deal with it. Once the farmer has traced any disease, they need to get the best solution as soon as possible, to reduce the effects of the disease.

A growth stage key provides a common reference for describing the crop's development, as to implement agronomic decisions based on a common understanding of which stage the crop has reached. The most commonly used growth stage key for cereals is the: Zadoks Decimal Code, which splits the development of a cereal plant into 10 distinct phases of development and 100 individual growth stages. It allows the plant to be accurately described at every stage in its life cycle by a precise numbered

growth stage (denoted with the prefix GS or Z e.g. GS39 or Z39)

Using Fungicides To Manage Cereal Diseases

Growers who can't or don't have long, diverse crop rotations will need to lean more on other management tools like fungicides.

Management of cereal diseases using fungicides is a holistic approach. Growers must integrate all available knowledge into pest management. They need to understand Crop biology and growth stage, pathogen biology and disease cycle, weather conditions and forecasts, field history, yield potential and yield target, economic thresholds and fungicide characteristics.

Fungicides are used to make

money, therefore though disease may be present in a crop at many stages through the crop's life it may not always be economical to control it.



As an input, the economic response to fungicide relates to the extent of the disease pressure, the ability of the product to control that disease, water availability to the crop to express the benefit.

Yield response from fungicides is linked to the differences achieved in green leaf retention, principally during grain fill. In order to achieve differences in green leaf retention during grain fill, it is important to target the leaves that contribute most to yield. Fungicides are insurance inputs: applied during stem elongation yet having their greatest impact during grain fill.

Whilst the number of fungicide applications, rate, and specific timings will relate to disease pressure and yield potential, it is important to recognize that fungicide application should also be related to the importance of the plant components being protected.

In application, growers should aim to control disease on the yield contributing leaves, protect disease free canopy during grain fill, improve grain fill, harvest large grain size, improved yield and have improved quality characteristics

Application:

Every grower's fungicide strategy should be to protect the most important leaves. Then it becomes important to identify when the top 3 leaves emerge. In terms of the Zadocks growth stage,

the key top 3 leaves and ear emergence are covered by GS32-59 (the start of stem elongation to full ear emergence). At GS32 the leaf emerging from the main stem is likely to be leaf 3 or (F-2

If the onset of disease occurs at or before flag leaf emergence GS39 and a single fungicide application is delayed beyond GS39, then the risk of yield penalty



Barley



increases, more so if the cultivar is susceptible to the Disease. Unless the crop is subject to very late disease infection, a single application at this timing will produce inferior results compared to applying at the flag leaf stage.

Mainly this application is done to control disease in the top 2 leaves assuming an earlier flag leaf application and protect the ear that was not emerged at earlier spray timing. This spray timing could be important in regions with longer grain fill periods when crops are under high disease pressure for the whole season.

Many farmers grow cereals for commercial purposes, so there is need for taking care of what brings income.

Bomet County's Transformative Collaboration Empowers Farmers



Bomet County, under Governor Hillary Barchok, partnered with KALRO and Kenya Red Cross to bolster farming in Nogirwet, Chebunyo ward. This collaboration provided financial aid and technical expertise, focusing on Angaza variety beans cultivation.

Governor Barchok expressed gratitude for the support, highlighting the establishment of a demonstration farm for educating farmers. Recent inspections showed promising growth of Angaza beans, ensuring nutritional and financial benefits.

The partnership facilitated access to quality seedlings and training at an affordable rate. Barchok praised the partnership's potential in modernizing farming techniques and enhancing productivity. The collaboration served as a model for future agricultural initiatives, emphasizing collective commitment to food security and sustainable growth.

Mechanization Initiative for Farmers' Access

The government, through Agriculture Principal Secretary Paul Ronoh, reaffirmed its commitment to supporting farmers' access to machinery services to boost production and enhance food security.

The launch of Mahindra Tractors in partnership with Simba Colt Aspire Ltd was emphasized as pivotal for transforming farming practices and improving efficiency.

Various dignitaries, including Busia Governor Paul Otwoma and Indian High Commissioner Namgya C. Khampa, attended the event in Nairobi. Governor Otuoma outlined the county's participation, aiming to till 20,000 acres of land benefiting 150,000 farming households.

The initiative integrates mechanized tilling, agricultural extension services, and subsidized inputs to revitalize rural economies. Farmers are required to pay Sh2,500 per acre for mechanization, aiming for 20-25 bags of maize per acre to enhance yields.



Dr. Paul Ronoh, Agriculture Principal Secretary



A Path to Self-Sufficiency

Rice production in Africa faces a critical need for enhancement to avoid heavy import dependence and extensive land use for cultivation.

Demand for rice is projected to double in the next 25 years, with current production falling short and imports covering about 30% of demand. Research, including contributions from Wageningen University scientists, highlights Africa's potential to significantly increase rice production by improving farming methods. Agro-systems expert Pepijn van Oort notes that current yields are less than half of what could be achieved with better practices.

Mazuki Saito emphasizes the importance of not only improving farming techniques but also implementing supportive policies and institutions. Without yield improvements, Africa risks escalating imports and expanding land use for rice cultivation. This study, supported by the Bill & Melinda Gates Foundation through CGIAR Excellence in Agronomy 2030, underscores the urgency of intensifying rice production in Africa through sustainable agricultural development and policy enhancements.

Transforming Agricultural Research

The 3rd ASARECA Council of Patron Ministers Meeting in Nairobi unveiled crucial projects aimed at advancing agricultural research in member countries. These initiatives, including biofortification promotion, center of excellence establishment, aflatoxin reduction, and youth support in agribusiness, received significant backing from donors, with pledges totaling \$50 million. Kenya's Agriculture Cabinet Secretary Mithika Linturi, also ASARECA's Chairman, highlighted the organization's successful collaboration with National Agricultural Research Systems (NARS) across its 15 member nations,



Frank Tumwebaze, Minister of Agriculture for Uganda hands over the Chairmanship of the ASARECA Council of Patron Ministers to Mithika Linturi, the Kenyan Agriculture Cabinet Secretary

securing over \$258 million for Agricultural Research for Development (AR4D) initiatives.

Notable achievements in Kenya include combating Banana Xanthomas Wilt, enhancing water availability and productivity, and addressing Cassava Brown Streak Disease.

ASARECA Executive Director Dr. Enock Warinda emphasized the strategic focus on biofortification and aflatoxin reduction in critical areas, with meticulous planning ensuring effective utilization of funds over the next five years.



The 3rd ASARECA Council of Patron Ministers Meeting in Nairobi

Kenya's Commitment to Soil Health

Jeremiah Rogito, Program Lead, FOLU Kenya



During the World Soil Day Conference in Nairobi, Dr. Paul Ronoh, the Principal Secretary of the State Department of Crop Development and Research, emphasized the Kenyan government's commitment to prioritizing soil health for transforming the nation's food systems. Hosted by the Food and Land Use Coalition (FOLU) Kenya and partners, the conference highlighted the crucial link between soil health, land use practices, and food security.



Principal Secretary State Department of Crop Development and Research Dr. Paul Ronoh (right) and AGRA East and Southern Africa Regional Manager Prof. Jean Jacques Muhinda

Central to the discussions was the launch of the Kenya Food Systems and Land Use Action Plan 2024-2030, aimed at forging a more sustainable, inclusive, and resilient food system. Challenges facing Kenya's agriculture sector, such as suboptimal yields due to soil nutrient depletion and widespread soil acidity, exacerbated by climate change, were underscored. Collaboration among stakeholders was emphasized for effective implementation of the action plan, vital for ensuring food security, environmental sustainability, and economic prosperity in Kenya.

Kenya Receives Fertiliser Donation from Algeria

Mithika Linturi, Kenya's Agriculture and Livestock Cabinet Secretary, expressed gratitude for Algeria's donation of 16,000 metric tonnes of urea fertiliser, timely for the cropping calendar. Despite the donation, he highlighted Kenya's significant need for 900,000 metric tonnes of fertiliser. Linturi pledged government support, aiming to procure 630,000 metric tonnes in 2023-24, prioritizing smallholder farmers. He emphasized the importance of fertiliser in doubling production



Agriculture Cabinet Secretary Mithika Linturi and Algerian Ambassador to Kenya Mahi Boumediene at the Port of Mombasa on January 24, 2024

and supporting food security under the Bottom-up Economic Transformation Agenda.

Linturi outlined efforts to register 6.4 million farmers and enhance digital connectivity for service delivery. He urged stakeholders to follow the Agricultural Soil Management Policy and prepare for the upcoming planting season. In conclusion, Linturi reiterated the government's commitment to affordable agricultural inputs and collaborative sectoral advancement.

Collaborative Efforts and Innovative Solutions

At the recent International Fertilizer Development Center's (IFDC) 50th Anniversary event in Nairobi, Agriculture Principal Secretary (PS) Dr. Kipronoh Ronoh's speech, read on his behalf by the Ministry's Director of Agribusiness, Gilbert Muthee, highlighted the critical role of fertilizer in sustainable agricultural systems. The speech emphasized the importance of collaborative partnerships in addressing food security challenges and promoting sustainable soil health management.

IFDC President and CEO, Henk van Duijn, reiterated the organization's dedication to developing innovative solutions for fertilizer and soil health issues. With a vision to transfer nutrient use efficiency and soil health technologies, IFDC aims to support agricultural development and contribute to global food security.

IFDC's presence in Kenya has



been instrumental in advancing the national agricultural agenda through partnerships with the Ministry of Agriculture and Livestock Development. Initiatives like the Kenya Fertilizer Dashboard provide essential information on fertilizer availability and soil nutrition statistics, benefiting farmers and entrepreneurs.

Projects such as the Potato Value Chain Capacity Building and the

Africa Fertilizer Initiative demonstrate IFDC's commitment to increasing food production, promoting climate-smart farming practices, and enhancing agricultural productivity in Kenya.

These efforts align with the goal of achieving sustainable agriculture and food security in the region, driving economic growth and resilience in the agricultural sector.

Sulphur (S) as the 4th Macronutrient in Crop Nutrition

To minimize the gap between the demand and supply of cereals, oilseeds and pulses, intensive efforts are being made to increase their production.

As ever-increasing population and urbanization cannot allow increase in the land area under the cultivation of cereals, oilseeds and pulses anymore, yield per unit area needs to be improved further.

To achieve this objective, agricultural scientists have laid more emphasis on improving production of these crops through proper nutrition of the crops by evolving high yielding varieties and adopting improved agronomic practices as well as plant protection measures etc. The most important constraints to crop growth are those caused by the shortage of plant nutrients.

Sulphur is increasingly being recognized as the Fourth major plant nutrient after Nitrogen (N), Phosphorus (P) and Potassium (K). The importance of S in agriculture is being. Increasingly emphasized and its role in crop production is well recognized.

“Based on years of cumulative experience with sulphur testing, almost every soil tested does not have enough sulphur to produce top yields unless it is specifically added as part of the fertility program.” – Neal Kinsey and Charles Walters, Hands-On Agronomy, Acres U.S.A., August 1999. This is not different for the Kenyan soils!!

Why there is Shortages of Sulphur in Kenyan Soils.

- Changing agricultural practices

have led to Low Organic Matter in the soils reducing the amount of Sulphur in the soil.

- Sulphur Dioxide (SO₂) in the atmosphere is now less due to mandated emissions control
- Sulphur Containing fertilizers are being used less and less e.g. ASN, AS, and K₂SO₄.
- These Sulphates leach easily with high rainfall, or under irrigation.
- With the application of Sulphates only, as source of sulphur mostly in low organic soils there is no build-up of Sulphur in the soil.

Facts about Sulphur:

- Sulphur is a macro element in plant nutrition.
- Elemental Sulphur IS available to plants.
- Oxides are converted to sulphates along with Sulphur.
- Sulphur and Phosphorus levels required run more or less parallel i.e. Sulphate is needed for growing plants just as badly and in much the same amounts as phosphates.
- Nitrogen: Sulphur ratio is critical for optimal Nitrogen availability.

Why is this Nutrient Extremely Important and much needed by crops?

- Helps seedlings survive in cool, moist soils especially in early planted fields or for conservation tillage fields.
- Provides 50% more root development during early periods of growth.
- Sulphur is needed to make and increase protein content of the crops and increases oil content of crops like (Rape Seed) Canola.
- Sulphur is needed in plants to craft chlorophyll and to fabricate

enzymes and vitamins.

- It promotes nodule formulation in legumes.

Elemental Sulphur is the Solution!!

Sulphur is needed through all stages in plants growth.

Soils needs to have at least 10% Sulphur in sulphate form available early in the crop season for germination and seedling growth then the rest 90% along the season.

To achieve this, 10% can be supplied with commercial fertilizers like AS, ASN or MgSO₂ since they contain sulphur in sulphate form which is readily uptaken by plants. For the 90% Sulphur needed along the season relying on slow release source like elemental sulphur is the best. This Sulphur is not subject to leaching and is slowly released as it oxidizes in the soil. Therefore , farmers need to plan their fertilizer program to contain this crucial nutrient .To achieve a sustainable supply of sulphur throughout the crop season elemental Sulphur can be blended with Planting fertilizers like DAP or MAP.

A number of products are granular pure Sulphur based with trace elements in oxide form, the farmer can achieve a continuous Sulphur supply throughout the crop season. The Sulphur oxidizes slowly releasing sulphur in sulphate form and trace elements in a form readily available for plant uptake.

This fertilizer product is granular (size 2-4mm) and can be blended with all field grade fertilizers applied especially at planting.

Sorghum Cake

INGREDIENTS

1. 3 cups sorghum white flour
2. 1 cup Wheat flour
3. 4 tablespoons sugar
4. 4 tablespoons margarine
5. 3 Eggs
6. 3 cups milk or water
7. 1/2 teaspoon baking powder
8. 1 pinch salt

STEPS

1. Mix the margarine and sugar
2. Add beaten eggs in the mix
3. Fold in sifted flour and add remaining ingredients
4. Add milk (or water) to make soft paste after stirring with the table spoon.
5. Place mixture in a well-greased pan, baking tin or tray
6. Bake for 20-30 minutes.



FARMER'S JOKES

Distracting the Police!

Recently a routine police patrol car for drunk driving parked outside a certain popular bar.

The officer on duty noticed a man leaving the bar so intoxicated that he could barely walk. The man stumbled around the parking lot for a few minutes, the officer observed quietly. After what seemed like an eternity the drunk man finally found his car, having tried his keys on five different vehicles. After fumbling several times, he finally got into the car and sat there for a few minutes as several other patrons left the bar and drove off.

He eventually got into the car and started the engine, first he switched the wipers on and off...it was a fine, cloudless night, flicked the indicators on and off a couple of times, honked the horn and then switched on the lights. He moved the vehicle forward a few inches, reversed a little and then remained still for a few more minutes as some more of the other patrons' vehicles left.



Finally, when his was the only car left in the parking lot, he pulled out and drove slowly down the road.

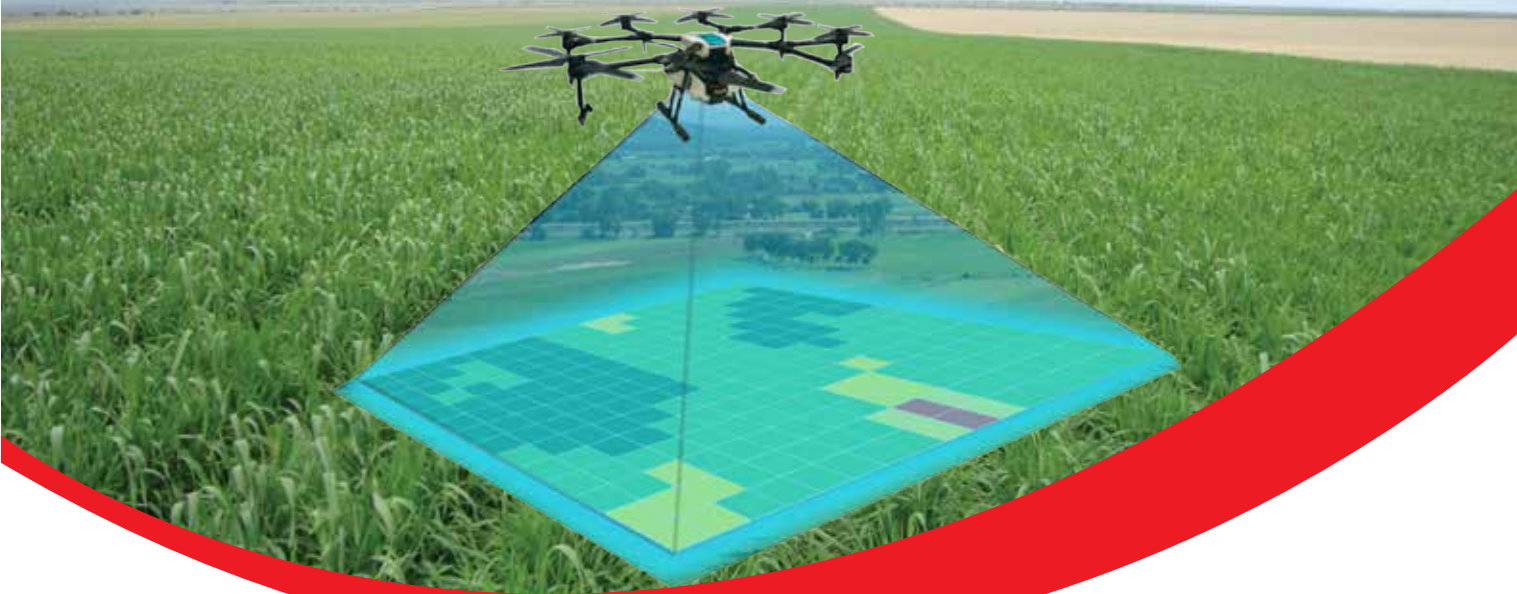
The police officer, having waited patiently all this time, now started up his patrol car, put on the flashing lights and siren, and promptly pulled the man over and administered a breathalyzer test.

To his amazement, the breathalyzer indicated no evidence that the man had consumed any alcohol at all! Dumbfounded, the officer said, 'I'll have to ask you to accompany me to the police station. This breathalyzer equipment must be broken.' 'I seriously doubt it', said the truly proud farmer. 'Tonight, was my turn to distract you'



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SATELLITE IMAGING



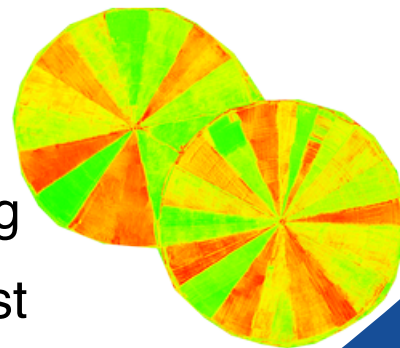
DRONE IMAGING



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