AUG - SEP 2019

HortiNews

Growing Ideas

ISSUE NO. 58 KSH 300

Keitt Exporters The home of Avocado Farmers

FloraLife®
Experts in Flower Care

Control the disease that most affects flower loss at the store level. Have better quality and better profits.

Floralife® TransportPAPER controls the spread of plant pathogens, such as Botrytis cinerea, which commonly destroy flowers. The host preferences of this fungus include virtually every plant grown in a greenhouse or field, produced for both cut flowers and potted plants. It is used during the transport of flowers in shipping boxes from the field grower to the buyer, bouquet maker, or greenhouse, to the retail store level.

Be proactive and start using Floralife® TransportPAPER in your floral shipments for happier customers, increased profits, and less waste.

'Akito Rose'—Control without treatment

'Akito Rose' with Floralife® TransportPAPER

For further information or to purchase Floralife® TransportPAPER, contact Floralife Africa at +254 780 000073 /+254 733 123 006 www.floralife.com

CONTENTS

Some of the Oserian Development Company staff graduated with diploma in Kenya Sign Language from the University of Nairobi a project sponsored by Fairtrade Africa for improving communication as part of its award winning inclusivity programme

8 Welcome to the first Flower Festival
10 False Codling Moth in flowers
13 False Codling Moth eats into finances
16 Garlic extract managing Nematodes
18 Flowers post harvesting procedures
24 United Selections goes solar
25 Keitt Exporters: The home of Avocado Farmers
30 Avocado production in Kenya
34 From a Lab Technician to the best Organic Avocado Grower in Muranga County
36 Mofarm: One of Kenya's leading Green Gold Exporters
39 High avocado fruit quality is key to competitiveness in the market place
41 Ansal F1the new bacterial wilt resistant tomato variety by Bayer East Africa
14 Botrytis – The most damaging floral disease facing flower growers and beyond
21 Disease resilient varieties

GLOBALG.A.P.

GOOD AGRICULTURAL PRACTICES FOR FLOWERS AND PLANTS

THE STANDARD BEHIND THE GGN LABEL

The GGN number shows that a floricultural product is sourced from a GLOBALG.A.P. certified farm. This product can be labeled with the GGN consumer label. The label leads to www.ggn.org – the online portal where consumers can find information about the producer.

www.floriculture.ggn.org

GLOBALG.A.P. | Spichernstraße 55 | 50672 Cologne | Germany | Phone +49 221 57 776 - 0 | www.globalgap.org

Specially aimed at Rose-flower producing companies

CROPNUTS
grow more, with less

In collaboration with

FlowerWatch
Quality assured

Post Harvest Technology & Water Quality **Training**

60% flower quality can be lost in post harvest. Don't let that happen on your farm - learn more about mitigating the risks.

We'll offer 2 main training modules

POST HARVEST TECHNOLOGY

- Understand water relations and hygiene through the post-harvest and its implications
- Understand the importance of farm water quality
- Bucket washing and drying best practice
- Post-harvest additives that will increase your vase-life
- Treatments to prevent leaf yellowing

UNDERSTANDING WATER QUALITY AND WATER REPORTS

- Water quality and its effect on vase-life
- Post harvest water treatment options
- Importance of post harvest water testing and how to understand your report
- Waste water treatment and understanding your nema reports

The Training will be conducted in 4 towns as follows:

- Naivasha – **12th September**
- Nakuru – **13th September**
- Nanyuki – **9th October**
- Thika – **11th October**

Your investment: Ksh. 75,000 exclusive of VAT (for a team of 4 attendees)

Book your slot today by calling Billy **0728 294 008**

CROPNUTS
grow more, with less

KENAS

Crop Nutrition Laboratory Services Ltd.
Limuru
+254 720639933 | +254 736839933
support@cropnuts.com • **www.cropnuts.com**

Follow us

HortiNews
Growing Ideas

EDITORIAL TEAM
Arim Ogolla - Horticulture Expert
Catherine Riungu -HortiNews
Clement Tulezi - Kenya Flower Council
Lusike Wasilwa - KALRO
Hosea Machuki - FPEAK
Okisegere Ojepat - Fresh Produce Consortium

MANAGING EDITOR
Catherine Riungu

WRITERS
Murimi Gitari
Anthony Mutai
Ndiritu Njora

CONTRIBUTORS
Dr Jane Ambuko - University of Nairobi
John Kihia- Floralife Africa
Nelson Maina- Elgon Kenya
Guy Keeble- De Ruiter East Africa
Victor Juma - Syngenta East Africa
Ruth Vaughan - CropNuts
Sharon Mikulinski - Floralife

MARKETING
Musyimi Ireri
Jane Wanjohi

PHOTOGRAPHY
Allan Muturi - Chief Photographer
Joyce Kimani - Photographer

DESIGN
Samuel Irungu

HortiNews is published six times a year by Karuri Ventures Ltd and circulated to personnel in the horticultural industry, foreign missions and Kenya embassies abroad, extension officers in the Ministry of Agriculture, research officers and suppliers of agricultural inputs and services.

KARURI VENTURES LTD
PO Box 1066-00518 iNairob
Tel: + 254 722848970, +254 710 628 440
hortinews@hortinews.co.ke
horticulturalnews@gmail.com

HortiNews Information Network

@hortinews
www.hortinews.co.ke

the EU is revising rules on quarantine pests leading to rejection of produce due to emerging pests such as the False Coddling Moth that has found a new home in roses sending growers and inspection firms back to their pockets in search of instruments to ensure exports are free of the moth and other dudus

Now we have it now we don't

When Kenya President Uhuru Kenyatta announced the country had struck a deal with China for avocado exports, the news was received with frenzy. A few months earlier, I remember receiving a call from State House asking for information about the fruit. I referred the caller to Ernest Muthomi the CEO of the Avocado Society of Kenya. Like a good citizen, the officer from the House on the Hill updated me on the outcome and appreciated the introduction. I didn't give it much thought until excitement rent the air on the China deal.

As details started falling into place, the CEO of the Fresh Produce Consortium Okisegere Ojepat was next. We got a raw deal from China and we must renegotiate the terms. By we, OJ like we call him, meant the country and the negotiators of the Beijing market. As we discussed why Kenya couldn't trade under the arrangement requiring export of peeled, chilled avocados due to lack of technology, a newspaper article had raised the same concern quoting farmers urging the government to go back to the drawing board. It has not been possible to establish how far the talks, if any, to renegotiatehave gone. Neither the Horticulture Crops Directorate, the Kenya Plant Health Inspectorate Service, the Fresh Produce Exporters Association of Kenya or the Export Promotion Council is forthcoming with a clear position on the deal.

Be that as it may, it is clear Kenya has upped its avocado production and as reported extensively in this edition, the crop is poised to grow into one of the largest agribiznesses in the coming years. The featured exporters, Keitt Exporters and Mofarm and farmer Robert Mburu have not shied from expressing open optimism. Keitt, arguably the largest buyer of avocados from contracted farmers, which says the fruit is currently its signature export product, is building a modern packhouse and processing factory in Kenol, Murang'a County. In the words of a director of the firm, the factory will take all available fruit for processing from its contracted growers. Mofarm on the other hand is moving to a bigger packhouse and reports a shortage of avocados.

Back to the China deal, HortiNews sort the views of exporters and industry experts. One said simply; its madness. But, she hastened to add, it could be an opportunity to bring the technology to Kenya, a big boost to our industrial development and increased earnings. OJ lamented lack of fumigation facilities for a country that sits among global giants when it comes to fresh produce exports. Now, talks about setting up a fumigation centre dates back to early 2000 and it's unbeievable almost 20 years later JKIA is yet to see one. This at a time our largest buyer, the EU is revising rules on quarantine pests leading to rejection of produce due to emerging pests such as the False Coddling Moth that has found a new home in roses sending growers and inspection firms back to their pockets in search of instruments to ensure exports are free of the moth and other dudus. The challenge of increasing invasion of pests and diseases, says Magana Flowers CEO Nicholas Ambanya resulted from shortages of fertlizer earlier in the year that weakened flowers leaving them susceptible to attacks. Costs to stay afloat are reportedly on the upwards of 40 per cent , a not too rosy picture for the flower industry.

As stated at the beginning of this column, HortiNews got a call from State House inquiring on the avocado. This tells you of a huge gap in availability of information on horticulture and for the umpteenth time we reiterate the need for this sector data to be consolidated and a centralized information system for reference be created. Who speaks for the industry again? We are yet to get an answer.

Catherine Riungu, catherine@hortinews.co.ke

Kenya Flower Festival

PRESENTS

BLOOM in BRAVERY

IN SUPPORT OF BREAST CANCER AWARENESS MONTH

26 Oct 2019

VENUE: **THE LORD ERROLL RESTAURANT**

BONUS

Home gardening tips and flower planting demos

Participate in the various flower arrangement contests

Interact with the leading flower farms' variety of the best Kenyan flowers

Glam your home with the best plants and flowers on sale

Learn tips to keep your flowers fresh

Free breast cancer screening

Win a variety of goodies

+254 745435260 info@kenyaflowerfestival.com kenyaflowerfestival

The Lord Erroll

Kenya set to hold its first Flower Festival in October this Year

Iconic Cascades by Magana Flowers during IFTEX 2018. It was the most photographed stand at the flower show.

By MURIMI GITARI

With Kenya being the third largest exporter of cut flowers in the world, the flower industry in the country is set to achieve another milestone by having the first ever flower festival on October 26th this year at Diana Hay Gardens in Lord Erroll Restaurant in Runda.

The festival idea, identified by a communications company – Bold Rose Communications, will be offering an opportunity to celebrate Kenyan flower enthusiasts and inculcate a culture of using fresh cut and garden flowers in our homes, offices, and all spaces of life. This will not only ensure a ready market, but will also instil a Kenyan culture of using flowers, and exchanging them with people to cheer them up, show empathy, love, happiness and gratitude in our day-to-day lives.

Rosemary Kimunya, the founder of the festival, says the event will be a one of its kind with the theme being 'Bloom in Bravery'. It will be happening during the month of breast cancer awareness and will include breast cancer screening during that day as a way of celebrating the cancer month.

Rose, who grew up in Limuru where flowers are grown in large scale, explains that she has spent lots of time doing research on flowers and is interested in seeing people use their creativity to make art from flowers rather than dwelling so much on science and exports which she says has been the case for a long time in the country.

"Kenyans need to develop the culture of giving flowers to each other instead of getting all what is grown here taken to other countries," Rose says. She adds that it is unfortunate to see that there are few Kenyans who know much about flowers and she dreams of seeing them growing and having flowers in their homesteads.

There are very few Kenyans who can afford to buy even a bouquet of flowers as many flower farms have concentrated so much on the export market and they only sell what they get as rejects (those that do not meet export standards) to the local market. According to Ms. Kimunya, during events like weddings, parties and even in offices, artificial flowers are used for décor. Ms. Kimunya and her team aim to see Kenyans embracing and affording the flowers grown by providing a market for the same.

A report by the Kenya Flower Council shows that Kenya is the largest exporter of roses to the European Union (EU) with a market share of about 38%. Approximately 50% of exporter flowers are sold at Dutch auctions, although

direct sales are growing worldwide. The flower industry contributes around 1.06% to Kenya's Gross Domestic Product (GDP).

Our target is not based on the economic aspect; it is about inculcating a culture of putting artistic work in flowers during events and in places where flowers are used for décor, she adds. We want to see Kenyans growing their own flowers, and have a culture of giving and receiving flowers by doing away with the perception that it is wastage to buy a flower, the founder of the festival, who is also an event planner and public relations professional, says.

The festival will have a show that will radiate with professionalism and feature top of the class floral designs, exhibitions and set-ups showcasing creative and diverse Kenyan floral arts.

The Kenya Flower Festival (KeFFlo) also wishes to appreciate flower enthusiast on this particular day by creating an online contest on bra designing and decorating using flowers under the campaign dubbed 'Glam your floral bra'. Entries will be recorded by way of registering on the website with a rule of using only flowers and environmentally-friendly materials to create a bra.

"The intention is to ensure that we support the Breast Cancer Awareness month campaign using flowers and creativity, hence Kenya Flower Festival - Bloom in Bravery Edition," the founder explains.

The event will provide a networking and marketing opportunity for flower enthusiasts and like-minded organizations. Education will also be offered on various flowers grown in Kenya and how to take care of them at home in order to give them a long vase life.

"There are flower farmers targeting local, however the reception at the local level has not fully developed. It is for this reason we are having the festival that will connect the flower farms with the market we are intending to create. As is the case, flower shows that are held in the country connect flower growers with the export market," Ms. Kimunya says.

An image of an elephant made of Rose flowers by Baraka Flowers during IFTEX 2019 at Oshwal Centre

Ms Rosemary Kimunya, the Founder of Kenya Flower Festival, KeFFlo

The event will have a couple of activities including education pieces by the various flower experts, children's activities, training on growing of different flowers as well as selling them.

The glamorous floral event will have exhibitors and will feature variety of presentations from leading flower farms, floral event planners, the floral bra contestants, artists, gardeners, landscapers, florists and wedding planners. There will be displays providing an ideal environment for informally training parties interested in the floral items.

It will be an all-day event culminating into a gala dinner later in the evening. Presentation of awards will be done for the different categories. Some of the proposed categories include: the flower farm of the year, floral designer of the year, Kenya wedding florist of the year, home gardener of the year, flower vendor of the year among other awards. Judges will be from the Kenya Floral Arrangement Group and other flower industry experts ❐

Pest Alert: False Codling Moth (FCM) in Ornamentals in Kenya

False codling moth is a multivoltine pest which does not enter diapause leading to year-round overlapping generations on host plants

By Victor Juma, Business Manager, East Africa lawn and Garden

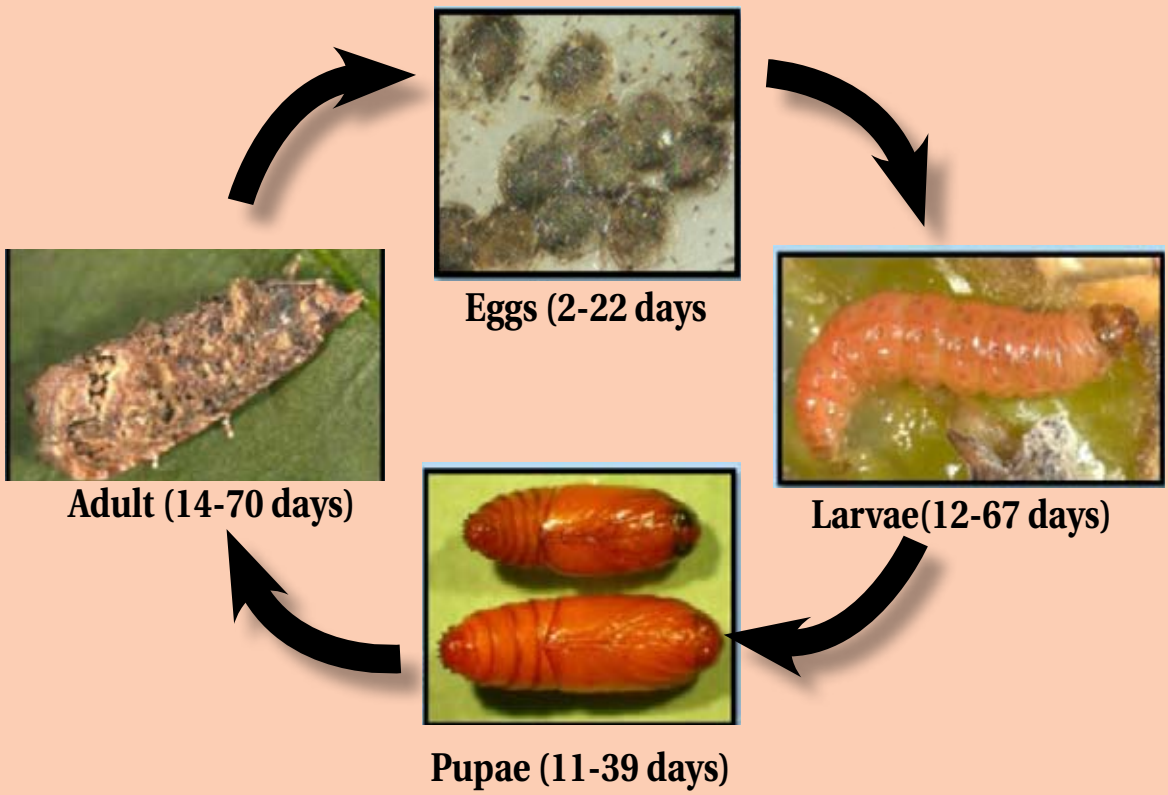
The cut flower industry, one of Kenya's most important sectors, earns the country around $0.5 billion annually. Production of cut flowers is, however, constrained by insect pests and diseasesamong other factors resulting in yield loss and poor quality produce.Of the pest challenges currently facing flower producers in Kenya is the false codling moth (FCM), Thaumatotibia leucotreta, which is categorized as a quarantine pest by the European and Mediterranean Plant Protection Organization (EPPO). Growers have suffered financial losses due to quarantine restrictions imposed on exporting countries and detection of a single larva can result in rejection of an entire consignment.

False codling moth is native to sub-Saharan Africa and is a pest of economic importance to many crops. It is a key pest of citrus, pepper, avocado,macadamias,and cotton. Previously, there were no known reports of FCM being a pest of roses until its larvae was detected several times by the National Plant Protection Organization of the Netherlands (NPPO) in buds of Rosa cut flowers originating from countries where the pest is present. Different studies and trials conducted in Kenya by several researchers has shown that FCM is widespread across the country with Kirinyaga, Murang'a, parts of Kiambu and Nakuru, Machakos and Kajiado counties recording high prevalence rates.

False codling moth is native to sub-Saharan Africa and is a pest of economic importance to many crops

False codling moth is a multivoltine pest which does not enter diapause leading to year-round overlapping generations on host plants. FCM has 2-5 generations annually in natural conditions. The life cycle of the false codling moth includes egg, 5 larval instars, pupa and adult. The completelife cycle takes between 30to 174 days depending on environmental factors such as temperature, humidity, food availability and quality and photoperiod, with 25°C being optimum.

Life cycle



Mated female moths fly at night, depositing eggs singly or in bunches on flower buds. At an optimum temperature of 25°C, females can lay three to eight eggs per flower bud and up to 800 over her life span. The hatched larvae penetrate making burrows about 1 mm in diameter and feed inside the flower bud. Mature larvae exit the flower bud, then drop to the ground on silken threadsto pupate in the soil or within plantdebris. After a few days, the pre-pupae turn into pupae, remaining as such in the soil till they emerge as adult moths.

FCM larvae are difficult to detect once they are inside the flower bud, and the singly laid eggs are difficult to detect as well. Thus, it is desirable to use the yellow delta traps baited with a pheromone lure to monitor the extent and densities of this invasive moth pest. Visual inspection of plants involves looking out for signs of poor growth or rot; holes in flowers; adults hidden in foliage; and crawling larvae.Once the flower is damaged, it becomes vulnerable to fungal organisms that causes rots. Infestations can be identified by the brown spots and dark brown frass.

CurrentcontrolofFCMin ornamentals consists of chemical application, mating disruption using pheromones and biological control methods, although cultural control practices including field sanitation, removal and destruction of infested flower buds remains an important foundation for all FCM control options. Additionally, the level of control achieved is therefore the sum of the efficacy of all the measures used, denoting that even if efficacy with a single measure is sub-optimal, when several measures are used in combination through the course of one season, levels of FCM control may well exceed 95%. ❐

FCM larvae are difficult to detect once they are inside the flower bud, and the singly laid eggs are difficult to detect as well

False Codling Moth eats into finances

Surveillance and inspection the pest to be present in most rose production areas except the Mt. Kenya region

Dr Esther Kimani

Listed among new pests, The False Coddling Moth is reportedly becoming a headache among rose exporters in Kenya. Kenya Plant Health Inspectorate Managing Director Dr Esther Kimani spoke HortiNews Managing Editor Catherine Riungu about the new challenge and filed the following report:

Catherine Riungu

How serious is the spread of FCM in flowers

The False Codling Moth (FCM) is a pest with a wide range of hosts. It is an important pest in citrus production. As a native pest which has been reported in tropical Africa, it is has not been shown to cause economic yield losses hence little is known about it.

In Kenya, FCM has been reported in roses and capsicum where it does not cause any significant yield losses hence not considered a serious pest concern by farmers. The pest has not been reported to cause any significant effect on the quality of roses and capsicum among other crops.

However, its quarantine status in Europe has affected trade with the European Union of the affected crops.

Surveillance by KEPHIS has identified the pest in most rose production areas except the Mt. Kenya region. Farmers exporting roses to Europe have to put systems that ensure products are free from FCM.

Had this been anticipated when FCM was first reported? Has it been anticipated it would attack flowers?

The EU carries out a Pest Risk Assessment on products being exported in large quantities to the continent. The Union reviewed its regulations to include FCM as a quarantine pest in 2017 and therefore any plant products found with the pest are intercepted. All trading partners were notified that the new regulations would come into effect in January 2018. The notification included regulations for capsicums and roses.

How is this impacting on exports, to which markets and to what extent? Have we suffered interceptions as a result?

FCM has affected the market by increasing cost of production. Businesses have had to invest more in pest management measures to ensure compliance. KEPHIS also has to carry out audits at farm level that previously was not necessary. We also introduced stringent inspection protocols resulting in large volumes of products being rejected at the exit point. The inspection levels at the EU for roses has also increased and this will lead to delays in produce reaching the market. Non-compliant flowers are destroyed hence a loss to the exporter and the country.

Kenya has had rejections of exported roses due to infestation by FCM. Interceptions lead to loses in revenue as the products found with the pest are destroyed. A lot of interventions have been put in place to manage the pest therefore increasing the cost of production. Though some of the interventions are bearing fruits, a lot of efforts still need to be made since the tolerance to the pest in Europe is zero.

On the other hand, KEPHIS cost of operations has also increased as more official controls have been put in place to assure the quality of produce and compliance to the new requirement.

What measures does KEPHIS give growers to curb the outbreak, manage infestation if it occurs.

KEPHIS has continuously carried out trainings and created awareness on the identification of the FCM with special emphasis on scouts and quality control officers .Growers are encouraged to monitor and manage the pest using pheromone traps, application of appropriate pesticides, scouting and grading.

Going forward, what is the country position on this and fresh produce exports in general?

There is need to ensure we continue to train growers on market requirements for compliance. There is need for continuous development of skill in identification of quarantine pests.

KEPHIS continues to build capacity of inspectors and quality assurance officers at the growers' premises since the pest is not easy to detect on roses ❐

#NHFAIR2019

NAIVASHA HORTICULTURAL FAIR

Conference I Exhibition I Buyer-Seller Meet

BOOK NOW!

Africas Largest Horticultural Fair

20th-21st Sept, 2019

Naivasha Sports Club

+254 726 629 666
+254 721 118 659
nhfair@naivashahortifair.com
www.naivashahortifair.com

Your Partner in Agriculture

Greenlife CROP PROTECTION AFRICA

@nhfair

Naivasha Horticultural Fair

Botrytis – The most damaging floral disease facing flower growers and beyond

By JOHN KIHIA, TECHNICAL MANAGER AFRICA AND SHARON MIKULINSKI, GLOBAL MARKETING DIRECTOR

Botrytis is considered one of the biggest blights in the floral industry, especially post-harvest where it survives easily, even in the cold, moist conditions of a flower cooler. Often referred to as gray mold, this fungus produces brown spots that are often followed by abundant fuzzy gray structures that produce spores on the surfaces of infected tissues. These spots grow in size and result in soft, mushy flowers that are often unsellable, and cause significant loss to those in the business. Flowers often show no symptoms when they are packed at the farm, but the disease develops during the shipping process, leaving the recipients of the flowers very unhappy.

The floral industry is losing more money as a result of Botrytis than any other foliar or flower disease. Growers struggle to control and manage this fungal disease and spend a lot of money for measures that are likely ineffective.

With Botrytis, it is easy for growers to become overconfident that all control measures are working until the wet season begins. Then, nothing seems to work. And, there is no silver bullet, such as a new generation of fungicide, that will suddenly make the problem go away.

The future of Botrytis control is going to require an integrated approach to control and manage – reduced pesticide applications, improved sanitation, modified cultural practices, and use of biological control agents. So, let's talk about this damaging disease.

What is Botrytis and how does it damage flowers?

Botrytis is a fungus that lives on living and dead plant tissue. The fungus grows rapidly and once the disease reaches the stage where the spores are present, they are spread very easily by water and air.

Botrytis spores will survive in production greenhouses and outdoors for about a year. Once the environmental conditions are good for germination, the spores quickly grow and attack petals, leaves and stems. As leaves or any other plant parts fall from the plant, the residue is a home for the fungus. Multiple life cycles can be generated on stems and in plant residue, thus increasing the number of spores rapidly. All these spores can be spread to flowers.

Botrytis spores germinate and grow tubes that puncture the petals or leaf surfaces and as they enter the cells, they emit a toxic substance that kills the internal tissue in the leaves and petals. This damage and growth results in the browning injury seen when Botrytis is present. And, once the damage took place there is no way to reduce growth of the fungus – the damage is done, and it just continues to expand and kill more of the petals and leaves.

Why is Botrytis so difficult to control?

There are many reasons why Botrytis is such a difficult disease for growers.

First, it has such a strong ability to survive under adverse conditions – often the presence of Botrytis is not recognized when conditions are not

good for growth. This is just a good natural survival mechanism.

Second, cultural practices may promote growth and/or survival.

Third, the environmental conditions for production of most flowers are the ideal conditions for Botrytis growth. Oh, and shipping conditions can provide a basic incubation chamber for Botrytis to grow.

Fourth, Botrytis, for the most part, may be resistant to the fungicides available to growers today whether they are used as sprays or dips.

Environmental Conditions for Botrytis Growth?

As mentioned above, the ideal production conditions are also the best conditions for Botrytis growth.

Botrytis will grow at any temperature from 2C (35 F) to 32+C (90+F). But, the most rapid growth is between 18 – 27C (65 – 80 F).

Then, one must add humidity. Moist production conditions are perfect for Botrytis growth as it is for plant growth. One belief is that Botrytis requires moisture to grow. Not True! Yes, when water is present, and the temperature is in the optimal range, spores will germinate in 4 hours. But, under conditions where the humidity is above 93%, spores will germinate in 8 hours.

Growers cannot really modify temperatures without affecting flower production. Humidity can, to some extent, control Botrytis.

Proper Sanitation – An Absolute Necessity for Botrytis to be Controlled!

Any dead or dying plant material within the plant canopy or on the floor can be a location for growth of Botrytis (and probably is promoting growth.). These sources of Botrytis must be carefully removed EVERY DAY).

Dead and decaying leaves must be removed carefully and gently. Aggressive raking or use of leaf blowers stirs the air as well as Botrytis spores which will most likely land on the plant canopy ready to grow.

Plant Nutrition

Some new and innovative nutritional programs are being evaluated to reduce the growth of Botrytis in the U.S., with on-site trials in Colombia and Canada (funded by the American Floral Endowment). At this time, the research requires additional trials before specific recommendations can be made.

So, what can you do to limit Botrytis damage?

1. **Be Clean** – avoid the spread of Botrytis due to poorly managed practices such as leaving plant residue in the production area. Remove all residue daily.
2. **Watering Practices** – Watering late in the day raises the humidity all night. Do not water after 2 pm daily.
3. **Grow resistant varieties** – this is never easy because customers have "favorites" and therefore, they must be grown. Search for roses with similar colors that offer greater Botrytis resistance.
4. **Hydrate Flowers Properly** so they are not under stress during storage and shipping.
5. **Do not put sleeves on wet flowers**. The humidity level in these sleeves will promote Botrytis growth.
6. **Do not pack flowers with wet leaves, stems or flowers**. Remove flowers from hydration solutions and let them sit dry for an hour before packing.
7. **Maintain consistent storage and shipping temperatures.** Temperature fluctuations result in condensation in the sleeves and the presence of high humidity and moisture both of which must be avoided if Botrytis is to be controlled.

Garlic extract managing Parasitic Nematodes

By MURIMI GITARI

Nematodes are the single most significant cause of crop losses worldwide in many crops. There are many different types of plant parasitic nematodes, but they have two features in common; cause directly or indirectly yield reduction or total crop loss, cause significant reduction in crop quality and therefore marketability and value.

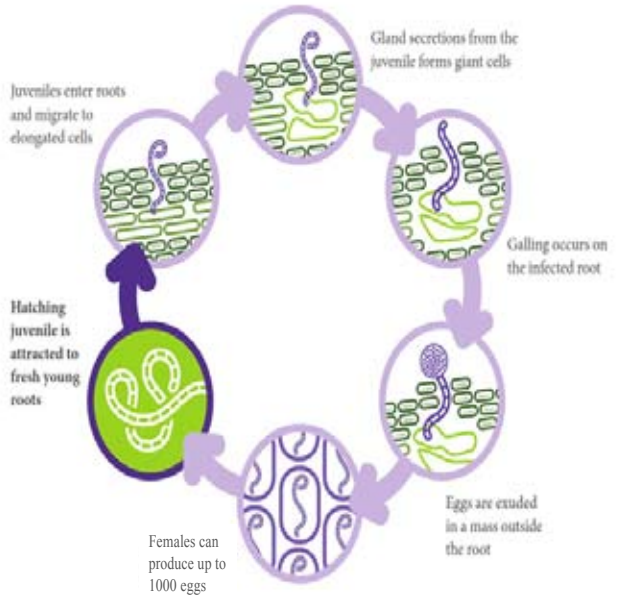
Ecospray, a biological control company based in the United Kingdom, working exclusively with Dudutech, their Kenyan Distributor based at Lake Naivasha (www.dudutech.com) have introduced a new product, Nemguard which is based on extract of garlic, which is now registered in Kenya for use by growers on Roses and French Beans.

Garlic (Allium Sativum) contains a wide range of carefully selected organosulfur compounds which show a variety of biological effects including nematicidal, insecticidal, antibacterial and antifungal activity.

The product was approved for use in Europe through the European Union and its member states have registered it for their own specific crop protection issues. Spain, Italy, Portugal, UK France, and Netherlands are some of the countries that have approved the product for use. Speaking to HortiNews, Lee Kaigai who is the Ecospray Regional Manager in East Africa says that Nemguard SC was recently approved for use in Kenya by the Pest Control and Products Board (PCPB).

Mr. Kaigai says that Nemguard has been positioned for sustainable management of parasitic nematodes that damage plant roots. Farmers can now reduce their reliance on existing synthetic more aggressive actives that are becoming less available in the market by opting to use Nemguard which has proved to be environmentally friendly and not harmful to human health. It is a natural product that is low risk and sustainable as it does not harm beneficial organisms in the soil like fungi and bacteria involved in the breakdown of organic matter.

"So far we have conducted commercial trials with flower growers where the problem exists. The approach has been first establishing the nematode threshold through soil sampling and analysis in the lab and we have obtained good control in the field."



Nematodes are destructive pests that cause yield losses. They feed on roots where they pierce them and take away nutrients and water from the plant. The piercing also enables entry of soil borne diseases and viruses introducing secondary infections. For flowers as an example Yield in terms of the stems per area is reduced while the flush period is extended due to stunting. Quality of stems is also reduced with smaller sized heads and thinner stems.

There are numerous genus of parasitic nematodes however locally Meloidogyne (root knot nematodes) that attacks plant roots causing galling is the most prevalent and widely studied. These are sedentary endoparasites meaning they have part of their lifecycle outside the plant root and part inside. Through the cycle once inside the roots the nematodes trigger abnormal multiplication of cells which results to formation of giant cells (galling) where they feed from. Eggs are exuded outside the roots and the infective juvenile has a needle like structure called a stylet that enables entry into roots by piercing. These are some of the distinctive features of this genus that have made it successful as a soil pest.

A keen look at the nematode problem locally will reveal other genus like Heterodera (Potato cyst nematode) whose incidence in Potatoes needs to be given serious attention. Awareness of this problem is now increasing with more experts in the field, availability of diagnostic tools locally and the desire by commercial growers to optimize yields.

Ecospray aim is to suppress the parasitic nematodes to allow crop yield and quality expression while ensuring soil health is maintained by not destroying beneficial soil organisms.

Dudutech train farmers on identifying nematodes and advising them on the importance of adopting Integrated Pest Management system (IPM) for sustainability of the environment. This is in regard to combining various strategies in controlling pests through cultural, physical, biological and as a last resort chemical means.

Ecospray is geared towards having a product that is a sustainable and safe option for managing parasitic nematodes problems in approved crops and are looking at other crops so as to expand the usage of the product. ❐

www.ecospray.com, info@dudutech.com

ELGON THABITI® FERTILIZERS

UREA, DAP, CAN & NPK

Why Use THABITI® Fertilizers.

- They Contain All The Registered Nutrients.
- Each Granule Contains The Correct Ratio Of All Essential Nutrients & Reduce The Risk Of Yield Loss.
- Have The Benefit Of Uniform Distribution Of All The Nutrients Across The Entire Field.

50kg, 25kg & 10kg

ELGON KENYA
TRANSFORMING FARMS & LIVES THROUGH TECHNOLOGY

National Park East Gate Road, Off Mombasa Road.
P.O. Box 46826 - 00100 Nairobi, Kenya
Office Line: +254 717 888 877, 733 509 509
E: info@elgonkenya.com
www.elgonkenya.com

Elgon Kenya limited
@elgonkenya

Mature for the cut

Harvesting and Post-harvest handling of flowers

By NDIRITU NJORA and ANTHONY MUTAI

According to industry experts, it takes about 10 years of sweat to deliver a flower to the market. From breeding to trials to commercialization then consumer acceptability a journey through which out of thousands of the initial seed, only one might cross the tape to deliver a two to three-week vaselife of beauty. It is those last weeks that matter most. Between harvesting the flower and purchase by the end consumer, one mis step can boomerang on the 10-year investment.

Where does the last mile begin? We asked Michael Gathage, a grower at Oserian Development Company? Are you asking about the harvesting procedures? We don't know, was our prompt response, which Gathage, a seasoned grower laughed out loud about. Yes, he said, harvesting with laid down procedures. Tell us about the procedures. Gathage took a pair of scissors and with a surgeon's precision demonstrated how to cut a flower stem when it is ready for harvesting. But before the cutting, a few other things are considered.

Michael Gathage, Senior Grower , demonstrating how the cut and hold secateurs are used at the cut stage of flowers

Harvesting flowers is a science, he told us. It begins at the cut stage. "Different flower varieties have different cut stages, and determined by client requirements. The right cut stage is determined by harvesting flowers in advance and placing them in a vaseroom to monitor behaviour and vaselife. If the flower droops it is not the right cut stage. The flower should open anytime from seven to fourteen days. Once the cut stage is determined, the grower can then grow the flower commercially on a large scale." Says Gathage.

Harvesting of flowers is done twice daily at Oserian, in the morning and in the evening for uniformity. This may as well be thrice a day according to the number of flowers that are ready and available to be harvested. A forecast done on the previous day helps determine what flowers to harvest, climatic conditions of the previous day are also checked.

The supervisor does a briefing during harvest on what is required.

"White varieties are more sensitive to damages, and are harvested using a sledge." He furthers adds. Harvesters are required to use a special set of secateurs which must be clean and sharp to swiftly cut, hold the flower and put them in their arms in one movement keeping the stem intact. The tool is disinfected by constantly dipping it into a sanitizer to prevent the spread of bacteria to the stems which pose a risk of blocking the uptake of water causing premature wilting.

There are three key factors considered when harvesting flowers - shape, colour and the ring. Shape is different in each variety. The colour of the petals shows the flower is ready. The ring of the flower refers to the size of the flower. The petals must be slightly open and not too tight. The cut point is determined by market demand with high demand the cut point is upwards when branching while when the demand is low the cut point is downwards.

Harvesting follows the cultural activities which are done by skilled personnel at the right stage. During this point, all the cut flowers are collected in clean buckets filled with a post-harvest solution that contains food for the flowers. The

➤18

DPL

the packaging experts

MANUFACTURERS OF CORRUGATED CARDBOARD BOXES
FOR INDUSTRIAL, HORTICULTURAL,
FLORICULTURE AND FISHERIES.

We are proud to be the preferred supplier of
Cargolite Flower Boxes

From The Directors, Management & Staff
of
Dodhia Packaging Kenya Limited

Contact: sales@dplkenya.com Tel: +254 721/734/772 295101
website: www.dplkenya.com

harvest is transported to the packhouse receiving bay, off loaded from the mode of transportation and placed in a shaded environment.

At Oserian, geothermal electric tugs have replaced trucks and ebery other minute they are seen snaking in and out of the packhouse reception after discharging flowers. The tugs arepart of the farm's green energy initiatives aimed at reducing carbon footprints for a safer environment.

As the flowers arrive at the pack house reception, they are dipped in a calcium hypochlorite solution which protects them against botrytis. All roses are dipped in the solution due to susceptibility to the disease. Once dipped, shaken to remove excess water and after 15-20 minutes. taken into the cold storage chain where temperatures of 4 degrees Celsius slow down metabolism to prolong vase life. After being in storage for four hours, they are then graded as per clients' specifications.

The most commonly checked diseases are botrytis, powdery and downy mildew, mites and damages. Breeders are developing pests and diseases varieties

Harvesting tools are sanitized in chlorine water to avoid spread of bacteria

The standard operations procedures (SoPs) at the pack house change after every hour. Flowers found to have defects do not make it to the grading stage. The quarantine area in the pack house checks for pests and diseases above 10 %. The most commonly checked diseases are botrytis, powdery and downy mildew, mites and damages. They also check on the mixed cut stage and wrong profile where reception records must mach with harvesting state details. Every bunch received is traceable to the greenhouse of origin and the staff who handled it and the time.

Post-harvest activities, include cooling, defoliation, cleaning, sizing, sorting, bunching, packing, storing and shipping. The main objectives of post-harvesting activities is to keep the flower stems cool, avoid loss of moisture, avoiding physical damages to the buds and toslow the metabolic activities.The quality of the stem flower is largely determined by the post-harvest activities.

Pests and Diseases

Due to the challenges of pests and diseases in flowers, breeders are increasingly developing varieties that are resistant.

"The most common pests and diseases in the flower farms at harvest are botrytis which mostly hits when its rainy, or in high humidity. To manage botrytis, we ensure there is minimal humidity among plants by providing good air circulation, we practice modified irrigation in cases where we have infected flower heads we remove them to prevent spread of diseases." Says Gathage.

Thrips also pose a big threat to the flowers, traps are set to attract the pests that are known to like the colour blue. The traps are also laced with glue which traps the pests preventing them from reaching the flowers. Besides this, Integrated Pest Management (IPM) is used to fight pests whereby a predatory mite known as Phytoseiulus is released into the plantation to eat destructive pests such as the red spider mites. These phytoseiulus get rid of the pests and leave the flowers intact thus no chemical sprays are used in pest control ❐

Disease resilient varieties

De Ruiter, one of the leading rose breeder's from The Netherlands, continues to work hard with growers to find specific varieties to combat the various diseases found in cut flowers. Growers are constantly looking for an edge over their competitors in an ever increasing industry to produce top quality product in an age when chemicals & pesticides are being strictly regulated. With this in mind De Ruiter is looking to come up with disease resilient varieties to tackle diseases such as Agrobacteria, with varieties such as (Furiosa®, Sonrisa® & Zanta®) Botrytis resilient varieties like (Frutteto®, Red One® & Mandala®) Downey Mildew resistant varieties like (Almanza®, Rhodos® & Pink Rhodos®) & Powdery Mildew resistent varieties like (Wham®, Rhodos®, Pink Rhodos® & Lovely Rhodos®).

Agrobacteria:

Furiosa® (high producing retail red).
Sonrisa® (high producing retail yellow).
Zanta® (high producing retail cerise).

Botrytis:

Frutteto® (large bud, premium, special shape).
Red One® (low altitude premium red).
Mandala® (special shape & colour).

Downy Mildew:

Almanza® (high producing retail orange).
Rhodos® (low altitude, premium red).
Pink Rhodos® (low altitude premium pink).
Lovely Rhodos® (low altitude premium bi-colour).

Powdery Mildew:

Wham® (premium auction pink)
Rhodos® (low altitude, premium red)
Pink Rhodos® (low altitude premium pink).

Roses are delicate flowers and need the best care you could give

Treating the water with Chrysal RVB Clear enables the flowers to drink as much as they can. However, sometimes roses endure even harder conditions: temperature swings and traveling long distances. Common problems arising are dropping of buds, flowers and leaves, accelerated ripening, leaf yellowing and curved growth, which all are negative effects of ethylene.

Chrysal AVB
is a post-harvest conditioner for ethylene sensitive flowers such as roses. Research has shown that allowing your flowers to have a solution with Chrysal AVB as their first drink after harvest will help them better to endure these conditions. Therefore, Chrysal recommends to have your ethylene-sensitive flowers in Chrysal AVB (1ml/l) for four hours after harvest. Make sure to use clean buckets and clean water so you can reuse this solution.

Following this, overnight conditioning of your roses in RVB Clear (1ml/l). This way Chrysal AVB helps to improve the vase life of your roses, diminishes dropping of blooms, leaves and buds and improves opening. ***Your roses are getting the best care they can!***

Chrysal RVB Clear
Stimulates water uptake and improves quality.

Chrysal AVB
prevents dropping of buds and premature aging.

CHRYSAL

For more info on our services and products, please contact us at: info@chrysal.co.ke

United Selections joins list of flower farms using renewable energy

By MURIMI GITARI

Flower farms in Kenya have taken a new direction by venturing into renewable energy to tame the cost of production of flowers with the latest being United Selections based in Nakuru.

The rose breeder, with a slogan 'breeding a colorful future' will be rolling out a solar powered system after having contracted a Kenyan-based projector owner, Ecoligo Limited who will be transiting the entire power supply to renewable energy from electric.

United Selections joins a list of flower farms in Kenya that are currently using renewable energy with Oserian Development Company Limited having of late launched 3,000 solar panels this year that were to add 1megawatt power supply to its previous 2.5megawatt of geothermal power. The two integrated produce sufficient renewable energy for consumption by tenants and residents of the Two Lakes Industrial Park.

Oserian has invested a lot in geothermal energy to power its operations in the farm like transporting flowers using electric tugs/cars from the farm to the packhouse. This has led to reduction of fossil fuel that was used in the farm saving from Ksh 400,000 up to Ksh 30,000 and by cutting the cost of buying diesel fuel.

Tambuzi Flower Farm, based in Laikipia County is also one of the few farms in the country that also tapped into green solar energy by having installed a 60 kilowatt solar-power system in a bid to reduce carbon emissions. The company was also able to save up to 10,000 kilowatts per month in electricity bills.

Leveling ongoing in one of the farms United Selections is putting up a solar powered system that will hold a capacity of 110 kilowatts

Operations in flower farms require a 24-hour power supply from the national grid with the direct solar feed at Tambuzi reducing installation costs of batteries that are no longer in use.

Uhuru flowers installed a 72 kilowatts solar power plant cutting its spending on electricity by 50 percent from Ksh 600,000 every month. Their solar power plant that was installed in the year 2014 was used by the Kenya Flower Council as a case study on using solar technology in flower production

The United Selections project will be a photovoltaic system that will hold a capacity of 110 kilowatts and will be kicking off in August/September. This will help save the company the cost of electricity as it is with other farms using renewable energy and reducing carbon dioxide emissions that will go down by up to 113 tonnes of the gas annually.

The company strives to create a better environment for everyone by being sustainable in all their operations with the current one being transitioning to renewable energy.

Another company based in Ruriu, Red land roses saves about Ksh 450,000 every month on electricity costs and being able to tackle the menace of power losses by using solar energy in the farm which ensures seamless and uninterrupted business operations.

The interest in investing on renewable energy by flower farms has also seen new vendors of medium to large scale solar power developers shift to investing a lot to the new emerging market. This is becoming the greatest payoff of investment in solar energy to the country's floriculture industry ❐

Keitt Exporters: The home of Avocado Farmers

Keitt is establishing a modern packhouse, processing centre and a factory at Kenol, Thika, Muranga County to centralise consolidation of the fruit and related operations which will be ready for the next avocado season early 2020

Asif Amin Managing Director

Isaac Mwangi, the Production & Technical Director

Dipesh Devraj, Commercial and Operations Director

Mr Francis Gichuru, the Avocado Farms and Agronomy Manager, made a presentation on the right way of planting avocados

By MURIMI GITARI and ANTHONY MUTAI

With three commercial farms, thousands of contracted farmers and a new state of the art pack house in the offing, Keitt Exporters is set to mark its 20th anniversary in the fresh produce business as the home of avocado farming in East Africa.

While pundits think the current wave of expansion in avocado production in Kenya is likely to dumpen the fortunes of growers as large volumes are offloaded into the market, Keitt is looking for more farmers to join its club as it gears to increase exports and feed the factory.

With eyes trained in a better future buoyed by rising demand in the local and export markets, a surge in processing avocado oil as well as other byproducts, Keitt is establishing a modern packhouse, processing centre and a factory at Kenol, Thika, Muranga County to centralise consolidation of the fruit and related operations which will be ready for the next avocado season early 2020.

For the 19 years the firm has produced and exported vegetables and fruits it is fairly familiar with consumer dynamics and inndustry trends to inform the next phase of development. The portfolio includes mangoes, passion fruits and premium vegetables like sugar snaps, baby corn, chillis, snow pea, French beans, with avocado being a top product. The name Keitt was derived from the mangoes business which was a flagship variety for over two decades ago. The name was suggested by the Managing Director, Asif Amin, and the Production and

Technical Director Isaac Mwangi. "Avocado is our flagship business now and for the future', said Dipesh Devraj, Commercial and Operations Director of Keitt that is handling some 600 containers in a season by sea and a similar number by air.

Markets

Any sales to China? Not yet. But we are ready to send fresh fruit when the deal is renegotiated given that at the moment Kenya doesn't have the technology to process chilled avocados. Managing Director Asif Amin says quality and consistency in the supply of high quality, pest-free and disease-free produce is the goal of Keitt Exporters for customer retention, markets expansion and sustained business, the reason the company is continuously training growers and putting in systems to ensure they are certfied by regulators and inspectors.

When the Chinese toured Kenya to access the country's capacity to supply avocados, Keitt Exporters is among the nurseries, farms and packhouse identified by the Kenya Plant Health Inspectorate Service to host the delegation attesting the firm's leading position in the sector.

Currently the firm has an exclusive market with various partners and customers in Europe where they are selling the Kenya avocados. Other markets are Middle East, Russia, Turkey and Asia.

Keitt's confidence in the future of the avocado is informed by reports the market is growing globally for the fresh market and processing into oil. Statistics in Europe show consumers have moved from eating 400g per person to 7kgs. Locally, for the past 10 years appetitite for the avocado has increased as Kenyans make the fruit part of their daily meals either with breakfast, lunch or dinner. Some consumers report substituting margarine with avocado as breadspread, Kenya's traditional foods – Githeri and ugali are not considered complete without a slice of avocado! These and other consumer habits have fuelled an unprecedented demand for the fruit, and luckily, some varieties produce year-round therefore avocados are available all through. Increased demand in the fresh market, pharmaceuticals and cosmetic industries provide feasible growth and expansion in production.

Josphat Mutuku, the Embu farm supervisor demonstrates on the process of transplanting avocado seedlings

Production

With avocado farming being a game changer in the country and many famers switching to avocados, Keitt sources fruit from own production harvested at its three farms in Embu, Meru and Subukia (Nakuru) and tops up with produce from about 4,000 out growers active at any one given season spread across the nine growing regions in the country. The three farms avearge 750 acres with over 50,000 top quality grafted seedlings at one given time. It also offtakes produce from single large commercial farms. Smallscale producers are advised to form groups with a minimum membership of 30 growers who cumulatively can put 50 acreas under the fruit. The nine growing areas of avocados include Muranga, Nakuru, Uasin Gishu, Machakos, Kajiado Embu, Nyeri, Kiambu and Meru counties.

Keitt specializes in growing and exporting hass and fuerte varieties. In their Embu farm they grow hass variety, Meru farm hass and fuerte varieties while in Subukia farm they have only Fuerte. The company is advising farmers to grow fuerte variety as there is a very high competition in the hass market.

Keitt specializes in growing and exporting hass and fuerte varieties. In their Embu farm they grow hass variety, Meru farm hass and fuerte varieties while in Subukia farm they have only Fuerte

"The focus right now with many growers and exporters is on the hass variety that has flooded the market leaving a wide gap on fuerte that will be in demand in some years to come therefore there is need for farmers to start planting fuerte" Said Isaac Mwangi, Production & Technical Director.

Isaac Mwangi, the Production & Technical Director says the uptake of seedlings from their nurseries is an indication of the rapid expansion in production as existing farmers expand and new growers board the train. New farmers who purchase Keitt seedlings are encouraged and supported to join the firm's growing outgrowers club to benefit from a guaranteed market and technical support. 'We sell certified seedlings and our agronomists work with the farmers through the journey till harvest, providing regular guidance and support every step of the way to maximise production", said Mr Mwangi who added this includes harvesting timing. Their nurseries are in Embu, Meru and Subukia, with Embu as the model farm, where they take farmers for training on field days or arranged farm tours. The fruits that they get from these farmers who are their outgrowers do not mature at the same time being an advantage for them as they are able to get avocados at different times for the market. Where many farmers order for seedlings, they deliver at a collection point.

For Keitt Exporters avocado seedlings in Meru, Embu and Subukia contact Francis Gichuru: 0721359547, Isaac Mwangi 0722728691

Mr Mwangi notes that many farmers lack guidance in growing avocados, and not getting it right can lead to frustration. Produce rejection resulting from failure to follow laid down procedures and low tree productions are some of the challenges. "To avoid these and other challenges, we partner with our growers to offer the guidance and react to any emerging issues", he explained, emphasizing on the need to obtain certfied seedlings, conduct a soil analysis to identify the right fertilizer, apply the recommended fertilizer and water the tree. "Avocado requires water to do well, drip or jet sprinklers are good for watering', he said. Keitt's farms are all under irrigation while the firm works closely with CropNuts for soil and nutrition health.

Keitt Exporters team with the delegation of Tharaka Nithi farmers at the Embu farm

Many farmers lack guidance in growing avocados, and not getting it right can lead to frustration

Take good care of the soil for best results

A group of farmers and Keitt Exporters team during a farmer's day at their Embu farm

A healthy avocado tree has a taproot that can penetrate to one meter, with most of the feeder roots in the top 20cm of soil in the drip zone. Its roots are generally shallow and spread in the soil surface in search of water and nutrients. The taproot holds the tree firmly only releasing water when it is extremely dry. The branches tend to follow the roots towards the source of water therefore keep the bottom of the tree moist to maintain the tree within manageable spread, with a clear distance between plants and rows for sufficient lighting and feeding.

The feeder roots are very delicate. Root rot (Phytophthora) can develop very fast when damaged or waterlogged. It is important to determine, in advance, the fitness of soil for avocado production.

Soil profile pits should be dug throughout the farm, at least 1.5 m and a minimum of one pit per ha (more in hilly or non-homogenous areas). One should look at soil color, texture, hard pans, sitting water, structure, patches, concretions, gravels and stones. Soil samples should be analyzed for chemical and textural properties. Samples should include both the topsoil (0-20cm) and subsoil (20cm-1m). Drainage and soil depth can be increased by mounding the soils up.

Red / brown soils are preferable, yellow /grey/light brown soils are often prone to temporary or permanent water logging. Very dark or black soils tend to have too much clay or a large percentage of organic matter that may result in acidic conditions and aluminum toxicity.

The clay content in soil can be determined by conducting a soil texture analysis in the laboratory. Avocados do best in soils with 20-40% clay. In soils with a low clay content (<20%), the water holding capacity is generally much lower, requiring frequent irrigation otherwise the roots may suffer from temporary drought. Very heavy clay soils have high water retention and lower infiltration rates. These soils may become oversaturated during heavy rainfall or over irrigation which promotes root rot.

Keitt key message to farmers as production increases, don't just plant avocados. Obtain certfied seedlings and link yourself to a buyer. In the coming days we will need all the fruit for processing. But we don't buy fruits from anyone. We buy from contracted farmers.

Soil structure plays a big role in production and root health. Strongly developed block structures, soils that break into hard clods and soils that have large cracks when dry are unsuitable. Soils should only show small, fine cracks when the soil dries up.

Avocados can grow in soils from pH 5-7, with an optimum PH of 6.2 t0 6.5. A complete soil analysis, done in good time well in advance of planting is essential. Lime is added to acidic soil to increase the soil PH to 6.5. Dolomitic lime is part substituted for calcitic lime if magnesium is deficient. If phosphorous is deficient it should be added along with the lime and mixed thoroughly into the soil prior to planting. If the soil is too alkaline, the PH may be reduced by adding Sulphur and keeping the soil moist for 6-12 months.

Calcium is a critical nutrient in avocado production. Soil levels need to be higher enough to suppress root rot. Plant levels are important for the nutrient content and storability of the fruit.

Farmers' day out

During a visit by a group of farmers from Tharaka Nithi County at Keitt Exporters Embu farm, Mr Francis Gichuru, the Avocado Farms and Agronomy Manager, made a presentation on the right way of planting avocados. He advised the attentive growers on the importance of obtaining seedlings from known sources for assurance of type quality and maturity. "Don't buy seedlings from the roadside because they are cheap. Chances of not knowing what type you are planting are high and so is the possibility of its not thriving into a mature productive plant", he advised to laughter from his audience who later confessed to have suffered the fate. Seedlings, he added must stay in the nursery for not less than one year to withstand the shock of transplanting and be clean of root pathogens.

Transplant by digging a hole of 2X2 ft. The soil dug out is mixed with manure at a ratio of two wheel barrows of soil to one debe of manure and returned to the hole without compacting the mixture. The seedling is placed in a raised bed to control waterlogging which causes root fungi. Good spacing of 4X6 between rows is recommended due to shallow spreading nature of the avocado feeder roots to create sufficient spacing for feeding and light for the leaves.

He added that avocado trees are maintained by watering them once or twice in a week provided mulching is done.

"When planting ensure the soil is not compacted and do not provide any kind of nutrients to the seedlings other than manure," he said. The first fertilizer application should be Nitrogen, Phosphorus and Potassium (NPK) at a ratio of 3:1:3 applied after four months which should last for up to one year before the next application.

Avocado farms and Agronomy manager Mr Francis Gichuru with the delegation of farmers from Tharaka Nithi County at the Embu farm

Afterf 18 months, apply Zinc and Boron by way of spraying or applying on the ground to provide sugars to the plant and help in pollen germination respectively. Avocado trees in Kenya flower in August and farmers are advised to feed the plant four months earlier. The young avocado tree is whitewashed to reflect sunlight and prevent damage. It is critical not to dilute the solution too much.

With common fruit fly and False Coddling Moth being the main pests in avocados and major threats, Mr. Gichuru reports there are very simple ways of tackling the predators. Pheromone traps are effective in knowing the ratio of males to females and type of pests in their farms.

One of the farmers, Gitari M'Rachi, noted with concern how they have been growing avocados the wrong way and with the brief training they received, they are now going to do it the right way with expectations of reaping higher yields.

"We have been mistreating the avocado trees and now with this kind of information we now aim to embark on a journey of transforming our orchards ," Mr. Gitari said amid applause from his peers.

The delegation of farmers showed great interest going by the questions raised. They engaged the technical team at great length and requested Keitt Exporters team to visit their farms to sensitize them and other farmers more on production as they also organize themselves for another tour which will attract more growers from the county, with assurance of signing supplier contracts if they are organized and ready for training in Good Agricultural Practices.

The Keitt team together with the directors of the company hold regular field days and spend the day with farmers – this is an old traditional concept from tobacco farmers in Zimbabwe who meet together and see the good, the bad and also exchange ideas on the fields as they walk the talk – a new concept introduced by Keitt management says Dipesh Devraj the firms Operations & Commercial Director. We also have regular specialist growers from Israel hosted by Keitt to visit our farmer's fields at the cost of Keitt – this is an imitative we drive so all of us can benefit on increasing our yields.

The County Government official Wilberforce Muriungi said the relevant departments would mobilise the necessary support to ensure Tharaka Nithi can tap the huge potential in avocado for increased farmer incomes ❐

Avocado production in Kenya

By Dr. Hezekhiah Agwara (BIF)
Ian Kopar (ACRE AFRICA)
Stella Ndirangu (ACRE AFRICA)

Immature fruits aborted before maturity. The fruit abortion can be linked to self pollination or poor nutrition for the tree

The equatorial climate in Kenya is favourable for avocado production. The country enjoys a competitive advantage over leading global producers (Mexico, Chile, Spain, and Israel) because the main harvesting season extends much later into the year when the leading producers are offseason. In the past few years, avocado production in Kenya has been increasing rapidly due to increasing demand in major export markets, better market organisation, and better prices for the fruit. This has led to the categorisation of avocado as the fourth most important cash crop, representing 17% of Kenya's exports.

Avocado is produced in several agro-ecological zones in Kenya, with major concentrations in the highlands regions – Murang'a, Meru, Embu, Kisii, Nyamira, Nyeri and Kiambu. Production is considered for local consumption and export. Kenya has been ranked as one of the highest avocado exporters in the world – number two in Africa in 2018. The major varieties produced in Kenya include are Fuerte, Nabal and Puebla, with Hass and Pinkerton fast emerging. The main varieties grown for export are Fuerte, Hass, and Pinkerton, which constitute about 30% of total production, while the rest are Puebla, Duke, Nabal and G6 for domestic consumption. Production cycle typically begins in October, followed by a dry spell in January to end February, and then the long rainy season from March to May; harvesting starts from April and continues into September, depending on the region and variety.

Avocado agronomic practices

Establishing an avocado orchard: Theory versus Practice: Let us get it right from the onset!

Although avocado can grow in multiple locations, it is important for farmers to understand that there is a difference in the scientific or theoretical and the practical procedures to follow in establishing an avocado orchard. For example, in theory, farmers in Nandi can purchase avocado seedlings from KALRO in Thika. However, in practice, the seedlings from Thika are acclimatised (or are used to) the climatic conditions in Thika and Central Kenya not those in Nandi.

As a farmer, there are critical requirements that MUST be considered before you can venture into profitable avocado production. These include:

Climatic range

It is important that a farmer only establishes an orchard if their land falls within suitable climatic range. The avocado tree does well in all altitude ranges, from sea level to 2500 metres above sea level. Some cultivars, such as Simmonds, Booth 7, and Booth 8, prefer low altitudes of 90-800 m; Hass and Nabal are more versatile, 800-2100 m, and Fuerte and Puebla are restricted to 1500-2500 m. altitude is important because the avocado tree prefers temperatures of 15-30°C, with high humidity, and can withstand as high as 33°C.

Avocado tree prefers well distributed annual rainfall of 900-2000 mm. For optimum productivity, trees must be exposed to a period of stress (dry season) for about 2 months followed by rain to induce flowering. Sufficiently high moisture content and light showers at the time of flowering and fruit set ensure good yield; off-season flowering and

fruiting can be induced by stressing the tree and then watering. Avocado tree has a relatively shallow root system; thus, where irrigation is necessary, water should be applied frequently but in light applications (not more than 50 mm at a time). The tree is also sensitive to strong winds, which may lead to breakage of branches, drop of flowers and fruits, and uprooting of the tree. Moreover, hot dry winds may cause desiccation of flower buds or abrasions.

Erratic weather patterns experienced in recent years have adversely affected fruit yields and farm operations.

Soil Type

Avocado prefers deep well-drained soils with adequate organic matter for water retention and a pH range between 5.5 to 6.5. Waterlogged soils are not ideal for avocado production as such soils create an ideal environment for the development of root-rot disease caused by the fungus Phytophthora cinnamomi, which is usually associated with lack of aeration. Furthermore, the tree has very low tolerance to salinity. It is therefore important that farmers involve accredited government institutions, such as KALRO, and private companies, such as SoilCare Limited, to carry out regular soil tests to ascertain the properties of their orchards. Soil testing is a crucial factor in crop production and helps farmers identifying mineral nutrient deficiencies for appropriate remedy. Annual application of organic and inorganic fertilizers, lime, and foliar feed is critical for avocado tree yield and pest/disease control.

Source of Seedling and Grafting

Grafting is common in avocado seedling propagation. It is done to improve survival, increase genetic diversity, and growth vigour. The scion should be dominant and match the size of the rootstock.

Rootstock

A rootstock is a stem with a well-developed root system, to which a bud from another plant is grafted. In avocado production, the desired rootstock varieties in Kenya include Fuerte, Puebla, and Duke. It is, however, important to note that it is desirable to source rootstock varieties from similar agro-ecological zones as the location of the orchard for ease of climatic adaptation. If the varieties listed above are not available, you can select a rootstock from a local avocado tree that grows well within your area. Avocado orchards are not uniform either in tree behaviour or in productivity. They are probably the most non-uniform of all fruit trees. The technical explanation for such a phenomenon is the rootstock variability resulting from seed heterozygosity (Gene diversity).

Factors to consider when selecting the rootstock:

Should be from a similar agro-ecological zone (the same way a maize farmer 1. in Nandi cannot plant maize varieties from Makueni but can plant varieties from Kitale, then the avocado rootstock planted in Nandi should also come from an area with similar climatic characteristics)

2. Should be from a tree that has a history of healthy and multiple fruits production (if you use a rootstock from a tree that produces very little fruits, then even after grafting, the basic production characteristic will remain low)

Scion

The scion is a young shoot, branch or bud that is taken from one plant to be grafted onto the rootstock of another plant. Farmers should endeavour to get quality scions for grafting, as this will develop into the productive crown of future avocado tree. This should be sourced from healthy and high yielding mother plant that is true to type and with a history of producing high-quality fruits.

Factors to consider when choosing a quality scion:

Should be from a tree that has already started producing fruits (this means it has mature reproductive hormones). As a result, after grafting, the scion will form into a shoot that contains mature reproductive hormones and will be able to start flowering and producing fruits within 3-5 years. (If the scion is sourced from a young tree that has never flowered, then the newly grafted tree will take 7 or more years to bear the first flowers and fruit.)

Should be from a healthy tree – if the scion is procured from a diseased tree, it will carry on the disease and could cause an infection of other existing avocado trees in the area.

It is therefore imperative that the farmers consider the above critical pre-requisites while selecting or sourcing seedlings from accredited nurseries. There is a high possibility that the vendors may not be conversant with the characteristics of the different ecological zones from which the farmers come from.

In cases where they do, the nurseries may not be having varieties suited for all the different ecological zones ❐

What do I do if I have already bought seedlings or established my orchard without following

these steps?

Ian Kopar, an Agronomist at ACRE Africa advises the following:

Avocado farming is a long-term investment (30-40 years) that a farmer would wish to get right from the onset. It is recommended that you consult an Agronomist to visit your farm to provide on-site technical

Planting

The ideal spacing for avocados is 9 m x 9 m, which would give a plant population of 120 trees per hectare (2.47 acres). However, spacing depends on the variety and agroclimatic conditions; in intensively managed orchards, Hass can be planted at 5 m x 7 m and Fuerte at 6 m x 7 m intervals.

The planting holes should be 60 cm x 60 cm x 60 cm in length, width and depth. Seedlings should be planted in raised soil (mounds) to prevent water collecting at the base that can cause fungal infections. Fungal infections at a young stage permanently compromise long term yields and may shorten the productive life of trees (from 30-40 to 8-10 years).

Pollination

For optimum pollination and yield, it is also important that the farmers do not plant only one variety of avocado within the orchard. This is important because different varieties of avocado have different flowering patterns (Type A and B), agro-ecological requirements, and bearing patterns (consistent versus alternate). Self-pollination leads to heavy flower and fruit abortion – hence poor yield. Type A (e.g., Hass, Pinkerton, and Puebla) and Type B (e.g., Fuerte and Nabal) varieties flower at different times of the year and flowers open at different times of the day and days of the week. Type A female flowers are receptive to pollen in the morning and male blooms shed pollen in the afternoon; Type B flowers are receptive to pollen in the afternoon and their male blooms shed pollen in the morning. This means that optimal yield occurs with cross pollination between Type A and Type B flowers; therefore, mixing varieties in the orchard would enhance cross-pollination, which results in higher and consistent tree yield. In addition, keeping bees within an orchard would be an added advantage as bees are the main pollinators of avocado.

Intercropping

Land sizes for agricultural production in Kenya are becoming smaller and smaller causing farmers to intercrop for economic and food access during the first 3-4 years before the tree starts bearing fruits. Farmers should NOT intercrop avocados with crops that are alternative hosts to its common pests and diseases. Since pests and diseases can also be specific to locations, farmers are advised to consult their local extension officers for intercropping advice. Farmers should engage off-takers to provide guidelines on approved agrochemicals and fertilizers so that the fruit conforms to market and regulatory standards.

Crop protection

Pests and disease management is a major challenge to growers; particularly avocado anthracnose disease, fruit flies, and weeds. The use of agrochemicals in avocado is limited and whenever applied, farmers access them through local agrovet shops that are supplied by major agrochemical companies. Integrated pest management (IPM) practices are recommended for optimal crop protection and compliance with maximum chemical residue levels (MRLs).

Harvesting

Harvesting practices are key determinants of yield and quality of avocado fruit. It is critical that farmers invest in proper harvesting practices and technology. However, due to the high demand and competition for the fruit, picking immature fruit by unscrupulous farmers and brokers is common, which leads to poor quality fruit and high rates of rejection by the market. For market channels where the fruit is purchased 'on the tree,' off takers engage their own pickers to ensure quality is not compromised.

An example of interventions to get it right

From the agronomic information discussed above, avocado

On-farm grafting of seedlings by Kuga Seedlings Farmers Group in Kiamachimbi, Nyeri County

BIF also facilitated ACRE Africa to conduct a feasibility study on climate risk management solutions for the avocado value chain.

production requires extensive technical support to get it right from the onset. One of the key differences between a healthy productive orchard and premature cessation of production by the eighth year is the quality of seedlings and planting technology. Recently, farmers have taken up avocado production without the requisite technical and extension support only to be disappointed when the expected returns do not materialise. BIF identified these knowledge and technology gaps as key to avocado development and has been collaborating with Nyeri County Government to improve the capacity of extension services and farmers organisations to support avocado farming and marketing through training and organisation support.

BIF also facilitated ACRE Africa to conduct a feasibility study on climate risk management solutions for the avocado value chain. This was aimed at addressing increasing vulnerability to climate variations, and stems from the finding that financial institutions are willing to lend to the value chain but only if there are risk management solutions available. The study conducted an assessment to identify the key agronomic and weather risks affecting avocado production in Kenya for purposes of developing suitable risk management solutions.

Experience from this interventions so far shows that because it is a relatively new crop, even to Agriculture Extension Officers (AEOs), farmers have limited understanding of the best ways and places to source seedlings, characteristics of good quality seedlings, suitable varieties and the need to adequately mix varieties for optimal production, planting methods (variety-specific spacing and planting in mounds), proper tree and orchard management, and the effect of soil health and weather patterns on tree growth and fruit bearing. Moreover, the advice provided to farmers is oftentimes inaccurate. For example, farmers are being advised to cut down Fuerte and Pinkerton trees to plant Hass, which is considered more valuable, yet the major export markets are indifferent to these varieties; in fact, major exporters have indicated they equally prefer the three, if not more Fuerte.

Training, educating and advising the AEOs, Lead Farmers and farmers organisations has shown that most knowledge and technology gaps can be bridged relatively quickly and at affordable cost. The AEOs and Lead Farmers quickly picked up from the training provided to lead the education of farmers. In addition, better market structuring through better organisation of farmers and linkages with off takers has been shown to increase the value of produce and farmers' incentives to invest in their avocado trees. The climate study developed weather models and produced advisories for dissemination, and also drafted a prototype index insurance product to be tested for the value chain. It confirmed that climatic patterns are critical determinants of avocado yield and output.

Agro-Weather Advisories: Using weather forecasts from Kenya Meteorology, satellite weather data trend analysis and agronomic data, ACRE Africa developed agro-weather advisories tailored for each value chain and specific locations. The advisories were developed using the weather forecasts for specific locations in relation to the agronomic stages of the trees. The advisories were then transmitted to farmers and other value chain stakeholders through text messages to form decision support systems.

Index Insurance: ACRE Africa has crafted a prototype weather index insurance, which will proceed to product development phase. The insurance product development process will take time due to the challenges in yield data and the presence of multiple middlemen (brokers) within the value chain processes. ACRE Africa anticipates that a tested index cover will be ready by 2020 for piloting, with the hope that it will enable more financial service providers to support avocado farmers more comfortably to increase production ❐

From a Lab Technician to organic avocado grower in Murang'a County

Robert Mburu Murega, an organic avocado grower, who took an early retirement after seeing the potential in avocado farming

By MURIMI GITARI

He probably never knew that he would one day be recognized and get awarded not only as the best avocado farmer but one who has ventured into organic farming of this green gold.

Robert Mburu Murega, a 66 year old retired Lab technician who worked in the ministry of Education took his early retire after seeing the potential of making more income from avocado farming. He had planted fuerte varieties that were the only grafted avocados in the early 80s when he was still a civil servant that would give him enough money.

In the year 2003, Mr. Mburu decide to quit his job to invest in farming where he added more avocado trees that he had already had in his farm.

Located a few meters form Kihumbuini shopping center in Kihumbuini sub-county in Muranga County, Mburu's farm has a total of 1,800 avocado trees of the hass variety after cutting all the fuerte and grafting them with hass.

"I decided to cut the fuerte variety and graft with hass due to the black spot deficiency in fuerte and the low prices they were giving at the time,"Mr. Mburu tells HortiNews after paying him a visit in his 8 acre farm. "I started with 100 hass trees after seeing the potential in them when I visited a farm at Kandara in Muranga County giving me a total sense of the variety where I grafted my fuerte and within six months started bearing 10-15 fruits," he adds.

From the year 2006, Mr. Mburu started planting plants not less than 200 seedlings that he makes from his nursery which is in his farm and fully cerified by the certification bodies in Kenya. He also sells the seedlings to farmers who come to buy from him and during our visit he had grafted 1,000 seedlings to a farmer who is yet to pick at a cost 0f Ksh 25o per seedling.

He started making his harvest in the year 2009 from the old grafted trees and the new ones by making an harvest of 40, 000 piceses of avocados from the old ones while the new ones would give him 20, 000 seedlings in a season.

'I do organic farming in my farm as it Is cheap due to the fact that I do not depend on pesticides or fertilizers but rather use compost manure that I make in my farm," Mr. Mburu says. He does not use any machinery in his farms as he has traps that he uses to counter fruit flies and False Scolding Moth FCM which are the most threatening pests in avocado farming.

"These traps are the best when it comes to monitoring the pests in your farm as they will help you know if the farm is highly infested by pests or not, you are able to do daily recordings in a pest control file of the pests that in your farm by the means of the traps," he explains. The recordings do not occur to those that use pesticides in their farms as they might not know what pests they have killed after spraying.

All the traps in the farm are numbered and contain phenomenon inside that attracts the pests where once they get inside they are trapped by getting stuck to a gummy paper and put inside the traps. When the farm is highly infested, Mr. Mburu keeps the traps all over and within a couple of days there will be few or no pests in his farm. FCM traps are kept overnight as the pests invade the fruits at night when they are very small in size.

He says that organic farming is very sensitive as one has to keep guard to the farm to ensure there are no strange things within the farm. He has a pit consisting of charcoal and concrete mixture where he throws away any kind of strange liquid that he finds in the avocado farm. The farm is well organized by having separated farm house, offices, cow sheds and the farm.

Mr. Mburu depends on rain water to water his plants and does not use any kind of irrigation.

An avocado tree at Robert Mburu's farm in Muranga County grown using compost manure only with no use of pesticides or fertilizers and depends only on rain water

His pruning stars in the first year after planting the seedlings while he prunes the mature trees after every harvest he makes. This is for the management of the plants where they will be able to get enough lighting and to control overcrowding. After pruning he applies liquid copper and white emulsion to the pruned plants that help control fungal infection.

He has put 40 fruit fly traps in the farm and 10 FCM traps. The farm has golden tree varieties that are believed to grow quickly and produce avocados early. There are also giant trees that produce about 4,500 pieces in every season with each piece estimated to go at a price of KS 15 though he sells his avocados in boxes.

The retired lab technician who served he government for only ten years applies the manure he makes to his plants in the months of July and August when there are no fruits to harvest. He gets more manure from the Maasai community to add to what he makes which is believed to be much nutritious to crops.

He currently sells his produce to Mavuno Orgnics, Kandia and Sunripe exporters but he is in the process of getting certified where he will be exporting directly from the month of September.

Mr. Mburu is certified by Eco-cert from Madagascar but based in France to practice organic avocado growing and Afri-cert, a Kenyan certifying body that is global.

When asked about the new China market, he overwhelmly supports it as it will bring a lot of benefit to the Kenyan avocados as there will be no further rejects again. This means that, with the exportation of peeled and frozen fruits, both fully grown avocados that are considered as rejects will also find their way to the export market together with the export ones.

Muranga county alone, exports 10 containers a day with farmers having planted more than 5 million avocado trees this year as the market continues to expand ❐

Mofarm: One of Kenya's leading green gold exporters

Mofarm Co- Director Maggdaline Kamau (center), Lydiah Muthoni, Packhouse Technical Advisor (right) and Clarisie Wambui, the Packhouse Manager displaying some of the avocados Mofarm exports

By MURIMI GITARI

It is a sunny afternoon when we catch up with Lydiah Muthoni who is the Packhouse Technical Advisor, at Mofarm Fresh Fruits Exporters, a company that won an award for the best medium scale exporters. After a warm welcome at the company's packhouse, located in Utawala, off Ring road, she takes us around the packhouse as she explains every step involved in preparation of exportation from receiving the green gold from farmers up to packaging and then shipping.

"We have a team that receives and offloads the avocados from trucks where they are later washed as they are taken to a sorting line machine that sorts the size of the avocados, helps remove unnecessary materials like leaves and twigs that comes along with them," she says. The company exports both hass and fuerte varieties with hass having a high demand in Europe while the demand for fuerte is in Middle East and Egypt.

Lydiah introduces us to Mrs Magdaline Kamau, one of the Directors of the company who is also the founder of the company. She is in her early 30s and after some brief introductions, she says she is ready to tell her success story on the birth and growth of Mofarm.

"We started Mofarm, initially known as Molo Farm in 2008 when I as at the age of 23 and my husband was at 26," Mrs Kamau starts narrating the journey of their success that has also been met by a quite number of challenges especially when they operations of exporting begun but were able to scoop them all. She says they named the company Molo Farm as they were living in Molo but later changed the name to Mofarm after releasing the first name was registered under another company.

They were motivated by an avocado farmer in Molo who had several avocado trees on his farm that he was selling to an exporting company that he was working for. They realized how it would be good for them to have such a company where they will approach such farmers to get their avocados and export for them.

"The farmer had so many avocado trees and many of the avocados went to waste as there were very limited companies that specialized in exportation of the fruits. At that time we were very young with my husband

but we decided to try it out by having our own company that will specialize in exportation only," the Director says.

She says they had no much money to start the business and they approached a packaging company where they struck a deal of getting their avocados packaged.

"When we started the business, we lost our very first container losing millions of money prompting us to almost quit," she adds. Their first vessel was supposed to go to Dubai but it found its way to Saudi Arabia. Mrs Kamau describes the situation as the most devastating one having it in mind they were new to the business with very high expectations of making money.

Other challenges the company has been experiencing since establishment according to the Director is getting orders that comes along with very stringent rules of quality specifications that they cannot be able to meet. There are buyers who want the produce without any kind of spots. Anthracnose is a disease affecting avocados bringing the spots thus being a major threat to the industry currently.

The Director who is also in charge of International marketing and exhibitions for the company and says they have so far been exporting in Europe, Middle East especially the hass avocados.

"The company has grown to a full limited liability and we have over 35 employees that we have employed to help in operations and we intend to add more workers as we await relocating to our new home that the company has put up to expand the business," Mrs. Kamau explains.

The company contracts small scale avocado farmers where they them with trainings on emerging farming trends though agronomists. The farmers also get inputs on credit or subsidized prices from the company after settling on an agreement.

Avocados being cleaned by a machine that grades them according to their sizes at the company's packhouse

"We work closely with these farmers to ensure we get the best quality avocados free from diseases, pests and any kind of deformity," Ms Muthoni, the Packhouse Technical Advisor who is also in charge of local marketing says.

Due to market demand and the stringent rules put the farmers are supervised in ensuring they adhere to the standards and to sound environmental farming practices. All farms that supply Mofarm with avocados are Global Gap, Organic and Field to Fork accredited and certified. Global Gap certification takes a period of 6 months while the organic one takes up to 3 years.

They have external auditors who go to the farms to check if farmers have met the set standards by the certifying bodies and adhere to agricultural practicing procedures. Mofarm works with both individual and group farmers who must have not less than ten stems per individual in every group. The groups must also have committee consisting of a chairperson, secretary and a treasurer. Every farmer is provided with a trace code that helps in tracing of where he avocados came from in case of any issues that would arise after the farmer supplies the produce to the company.

The cost of training farmers is expensive but the company has been sponsored by various organizations in training them. International Trade Centre, AFFA, KEPHIS, Export Promotion Council and USAID are some of the sponsors partnering with Mofarm in offering trainings to the groups.

There are 8 groups in Muranga, one in Meru and another in Machakos counties supplying Mofarm with avocados as they intend to diversify in other 31 counties that grow the green gold. Some counties have got cotton and rocky soils that not best fit for the growth of avocados.

The company buys directly from these groups or farmers so as to do

Readily packed avocados for exports by sea freight at the company's packhouse located at Utawala in Nairobi

away with middlemen who exploit farmers.

"It is our responsibility to give our clients consistent quality to enhance their value as we aim to grow on a solid base of trust and total dedication to the fresh produce industry which has also been showcased by President Uhuru Kenyatta when he struck a deal with the Chinese government and when he visited Malaysia early this year that led to the lifting of the ban on fresh produce," the Packhouse Technical Advisor says. The company has so far made shipment of avocados to Malaysia after the ban was lifted.

Mofarm preserves avocados in cold temperatures of 50C emphasized by temperature recorders after they are packaged and during transportation. Before shipping, they are also precooled at the same temperatures for six hours to ensure they do not go bad during their transportation. This helps in pro-longing their shell life. Containers used to transport them have gen-set or cooling facilities for cooling purposes with shipment expected to take about 28 days when being transported to Europe.

Mofarm has not yet started exporting to China even after the Asian continent opened its market for Kenya's fresh produce due to the sanitary and phyto-sanitary measures put by the Chinese government.

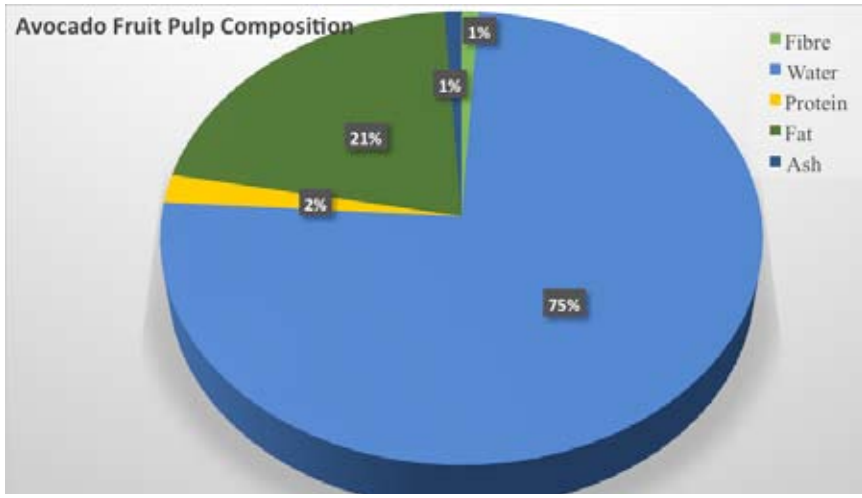
"These measures or rules put by China are an eye opener or wakeup call to us as they will help us add value to our avocados and here at Mofarm plans are underway to start exporting peeled and frozen avocados," Mrs Muthoni explains. She says China is trying to show that Kenya has untapped potentials that can come in existence by doing away with traditional way of doing things and using technology. Exporting peeled and frozen avocados will be convenient and will bring lots of money as compared to exporting raw ones according to Lydiah. She says that a 40 foot reefer or container carries 20 pallets of boxes with each holding 120 boxes of 10kgs. There are also pallets that hold 288 boxes of 4kgs meaning a 40 foot container can be loaded with 5,760 boxes of avocados. The space consumed by the raw waste materials of the avocados which include the seed and the peeled waste can accommodate more avocados when peeled and frozen thus bringing more money.

The company has already acquired a new sorting machine that comes along with facilities of peeling avocados as they get prepared for the China market and value addition to the green gold. The machine which is at the port of Mombasa awaiting clearance will be installed at their new premises in expansion of business by an Israel expert whom they will cater for all his expenses during the period of installation. They also have plans of extracting oil from avocados that will be used as cosmetic and for cooking.

Other than exportation of avocados, the company also exports mangoes, coconuts, thorn melon, baby corns, cashew nuts, vegetables, chillies, pineapples and butter nuts.

As we part short with the director and the technical advisor, they are all full of ambitions of growing the company from strength to strength in becoming Kenya's best avocado exporter the most value adding company to avocados and with all of this, to be the first company to export frozen and peeled avocados by meeting the set standards by the Chinese government ❐

High avocado fruit quality is key to competitiveness in the market place



Ripe avocado fruit pulp composition, adapted from Fats and Oils Handbook, 1998

By Dr. Jane Ambuko

Avocado has become increasingly important in Kenya as the leading export fruit which account for 74% of the export revenue from fruits. It is now considered as the 'green gold' – both for farmers and traders (especially exporters). Although most of the avocado producers target the lucrative export market, the domestic market is expanding gradually as consumers become more aware of the health and nutritional benefits of the 'super fruit'.

The fruit is a rich source of health promoting nutrients and compounds including minerals, vitamins E and C, and -carotene (pro-vitamin A), proteins, carbohydrates, fats and fiber (Fig 1.). It is noteworthy that avocado fruit contains approximately 2.5% protein which is significantly higher (2 – 10 times) than most fleshy fruits and vegetables. The fruit also contains a high oil content (10 – 20%), most of which is contained in the fleshy part of the fruit. It is also noteworthy that avocado contains more of the good fat – the monounsaturated fatty acids.

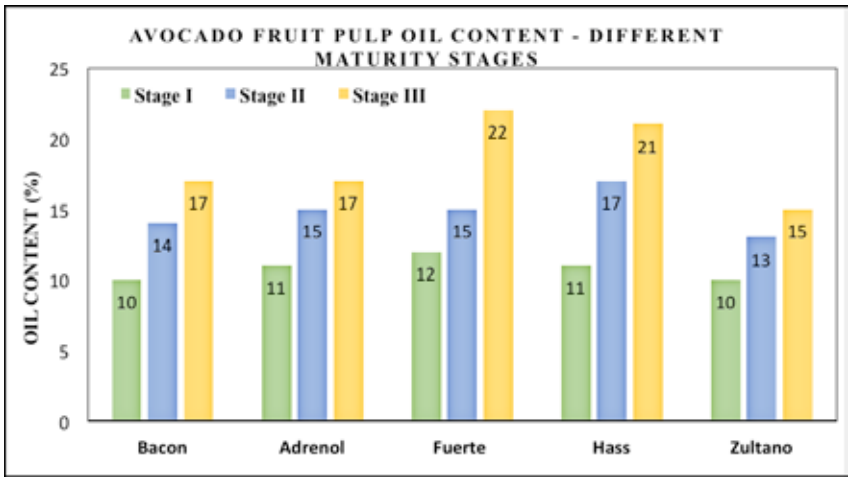
Of the many components in avocado fruit, its oil content is a critical quality attribute which affects market acceptance both for industrial and culinary use. Oil content is also used as an index of maturity in avocado fruit.

The use of avocado oil has been predominantly in the cosmetic industry, mainly because of its stability and high content of vitamin E which is a key ingredient in beauty products. However due to consumer awareness about the health benefits of the super fruit, avocado is gaining even greater importance in culinary use.

What factors affect the oil content and therefore quality of avocado fruit?

Among the many other factors that affect the oil content and quality of avocado fruit, variety, crop production/orchard management practices, agro-ecological conditions and harvest maturity are key. Oil content varies with variety – some varieties contain more oil than others. The dominant varieties in the Kenyan export market (Fuerte and Hass) have an oil content ranging from 14 – 20% depending on production conditions and harvest maturity. Oil content in other common varieties such as Bacon, Puebla, Duke, Adrenol, Pinketon, Zultano ranges from 10 to 18%.

Like other fruits the quality of avocado fruit is affected by preharvest production factors including crop husbandry practices. These include water and nutrient management, pest and disease management and other orchard management practices. Therefore best fruit production and orchard management practices must



be employed to ensure optimal fruit growth and development which subsequently affect fruit quality at harvest.

The agro-ecological conditions have an effect on avocado fruit growth and development and significantly affect the oil content. Kenya has diverse agro-ecological zones ranging from sub-humid to semi-arid. Due its wide adaptation, avocado fruit is produced in most of the agro-ecological zones in Kenya hence potential variation in quality of the fruits from the different AEZs. Unpublished studies (Boen, 2019) show that Hass avocado fruit produced in the less humid (dry) AEZs have higher oil content compared to those from the more humid (high potential) AEZs in Kenya. This means that even when avocado fruits possess similar physical attributes such as size and peel color, they may vary significantly in internal quality attributes including the oil content.

The same studies also showed that harvest maturity has a significant effect on avocado fruit quality attributes including oil content. Oil content was shown to increase gradually from <5% at 120 days after bloom (early harvest) to >13% at 180 days after bloom (late harvest).

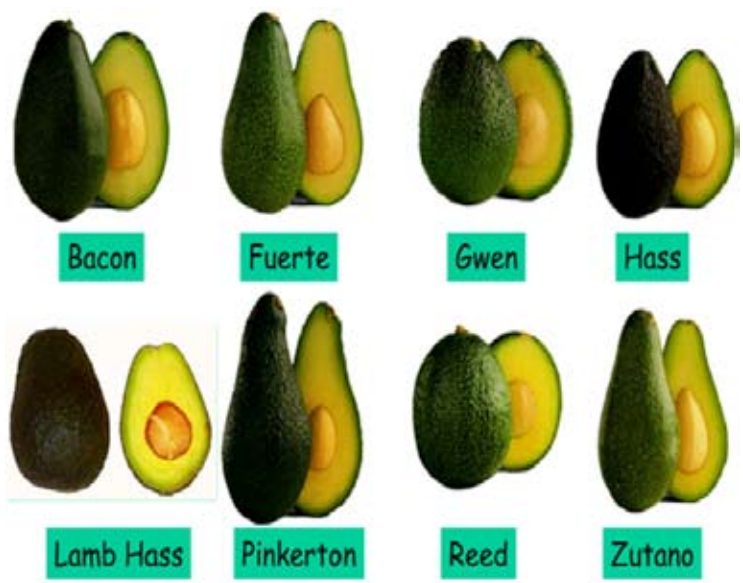
The high demand for avocado fruit, especially in the export market often pushes farmers to harvest the fruits early in the season (often prematurely) to meet their contractual obligations. Knowledge of the maturity indices for various avocado varieties so as to guide farmers on when to harvest the fruit without compromising the quality is important.

Immature harvest not only affects the oil content but also negatively affect the eating and keeping quality of the fruit. Fruits that are harvested too early (prematurely) have low pulp dry matter, watery texture, poor flavor, shrivel during ripening and don't ripen evenly. These attributes have negatively impacted traders and consumers perception of avocado fruit from Kenya.

As the global demand for avocado fruit continues to increase, more farmers (not only in Kenya) will increase production to take advantage of the market opportunities. For the avocado fruits from Kenya to compete favorably in the global market, efforts must be made to ensure that the factors that affect fruit quality are addressed.

There are various postharvest technologies and practices that can be applied to preserve quality after harvest. These include technologies for cold chain management, ethylene management, waxing to minimize gaseous exchange and water loss among others. However these technologies can only preserve the existent quality after the fruit is harvested. Therefore efforts must be made to ensure optimal quality at harvest and harvesting the fruit at the right stage of maturity. For Kenya's avocado fruits to compete favorably in the market place (domestic and global), there is need for concerted efforts and interventions from various stakeholders including farmers, traders, policy makers and researchers ❐

The Author in a Senior Lecturer and Postharvest Specialist, Department of Plant Science and Crop protection, University of Nairobi



Ansal F1 the new bacterial wilt resistant tomato variety by Bayer East Africa

Ansal F1 is distributed by Amiran Kenya

Elizabeth Mranda, Bayer East Africa Commercial Lead -Vegetables (left) with the Elijah Gitari (right) at the launch of Ansal FI variety. The new variety also has extra firm fruits that last three weeks after harvest and is a high yielder with 5-8 fruits per cluster

By ANTHONY MUTAI

Tomato farmers, traders and consumers in Kenya have a reason to smile following the launch of a new tomato variety that is resistant to bacterial wilt.

The Seminis Tomato Ansal, a hybrid variety launched by Bayer East Africa, a subsidiary of Bayer Global, is tolerant to bacterial wilt. The new variety also has extra firm fruits that last three weeks after harvest and is a high yielder with 5-8 fruits per cluster.

The Ansal F1 hybrid tomato is also resistant to tomato mosaic virus, verticillium wilt, fusarium wilt and root-knot nematodes.

The variety was introduced to farmers in late 2018 after a one-year period of on-station trials and off-station demonstrations plots with select farmers in Kirinyaga, Loitokitok and Nyanza.

Bacterial wilt is a soil and water borne disease caused by bacteria Ralstonia solanacearum which normally destroys 100 per cent of tomatoes. This disease can survive for up to 40 years in water, which explains its high incidence in regions, where river and lake water is heavily relied on for irrigation.

"Following extensive trials with farmers, we can confirm that the new variety is the answer to bacterial wilt in tomatoes. It is a great seed variety that will save the farmer huge costs in pesticides in fighting the disease," said Ms. Elizabeth Mranda,BayerEast Africa Commercial Lead - Vegetables.

Speaking during the launch event in Kirinyaga County, Ms. Mranda said Bayer was happy to launch in the County, which is the largest producer of commercial tomatoes in Kenya. She said research had revealed that tomato farmers lose between 50 to 100 percent of their crop due to bacterial wilt. She said the new variety targeting both small and large scale tomato farmers is now available in the market, and farmers can get it from all agro

The yellow and blue traps are used catch white flies and thrips in tomatoes

vets countrywide. It is distributed by Amiran Kenya.

Having retired from the county government where he worked as veterinary extension officer, Mr. Elijah Gitari ventured into farming. He has been growing the new variety for the last one year, said that the crop he was now growing was resistant to bacterial wilt, and was high yielding giving him over 30 tons per acre. The fruit also has a shelf life of up to three weeks after harvest, which helps minimize cases of post-harvest losses.

"With the old tomato varieties, I used to spend up to Sh. 100 000 per acre on pesticides and fungicides every season to at least suppress disease spread. I also used to have not more than 8 harvests per crop cycle. This reduced my profits considerably. With the new variety, the savings are now going directly into my profits," Mr. Gitari said.

He said that his yield had also increased, harvesting twice a week, 15-20 times per crop cycle, compared to between 4-8 times per cycle when he farmed with the other susceptible varieties.

Farmers from Nyanza and Kirinyaga county who attended the training at Kangaru village, in Kagio, were educated on ways to care for their fruits. The farmers were also taught on the use of the yellow and blue traps in tomatoes to catch white flies and thrips.

With the old tomato varieties, I used to spend up to Sh. 100 000 per acre on pesticides and fungicides every season to at least suppress disease spread.

"White flies destroy tomatoes as they suck the sap from the fruit, and dries it up," Gitari said. Gitari who has five acres of the new variety Ansal F1, is hopeful of huge profits when he delivers them to the market. "my advice to farmers wishing to venture into tomato farming should go for the new variety it will save them a lot."

Jackline Njogu, CEC for Agriculture Kirinyaga County said that the county will support farmers as they will sensitize people on the new variety as way of boosting production.

Dr. Jess Kambaka, plant pathologist who is the deputy director Karlo said they would train farmers on integrated pest management. "We can use technology which help reduce pesticide and chemical use. Bacteria wilt has been a major problem to our farmers, but with the new variety we look forward to boosting our production." She said.

The launching by Bayer of the bacterial wilt resistance Ansal F1 tomato variety has been welcomed by farmers who wish to know where they can purchase seedlings .so far the following companies have them as the company seeks to deliver the seedlings closer to the farmers.

Where to buy seedlings

Wanguru/Mwea – Mazao Na Afya, New Downtown
Siaya – Avepo Agrovet,
Kisumu - Kavirondo Chemist & Weva Supplies
Homabay – Awendo Stores, Kavirondo Chemist
Migori -Nyakandera
Nyahururu – Solai Agrovet, Green Acre, Nyahururu Vet
Subukia – Solai Agrovet Branch

INCREASE YOUR PRODUCE

with ELGON-IRRIGATION Systems

NAANDANJAIN MAGNAR galcon

CELEBRATING 120 YEARS OF SERVICE TO THE NATION ★ SINCE 1898 ★

ELGON KENYA

TRANSFORMING FARMS & LIVES THROUGH TECHNOLOGY

National Park East Gate Road, Off Mombasa Road
Office Line: +254 717 888 877, 733 509 509
E: info@elgonkenya.com | www.elgonkenya.com

VOTED Superbrands East Africa's Choice 2019-2020

WORLD FLORAL EXPO

March 25-27, 2020

Jacob K. Javits Convention Center Hall 1E

New York, NY - USA

COME AND JOIN THE 'PETAL PARADE' THIS MARCH IN NY!

Register online to get your free entry badge!

www.worldfloralexpo.com