November - December 2019

THE LEADING FLORICULTURAL JOURNAL IN THE REGION

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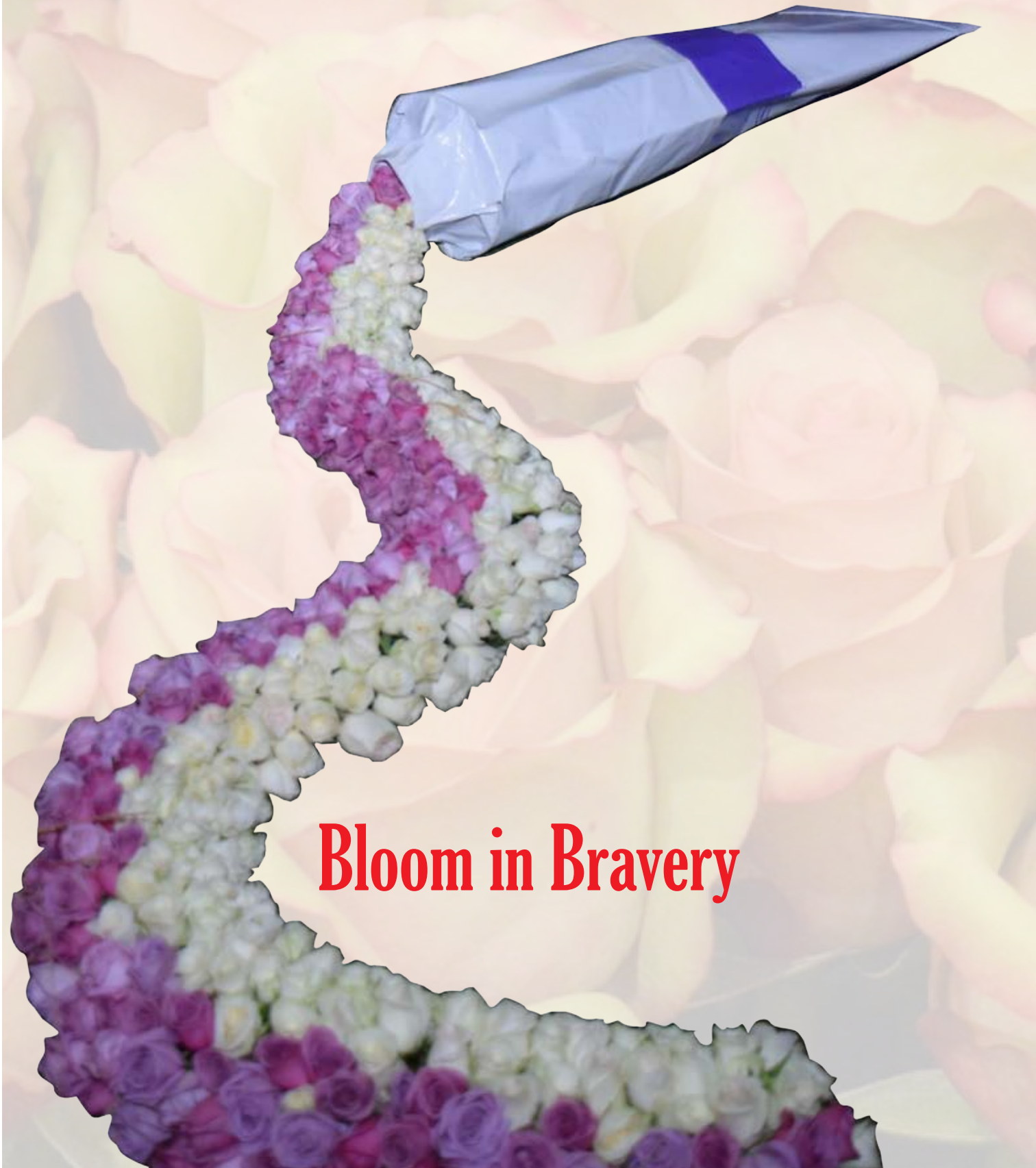

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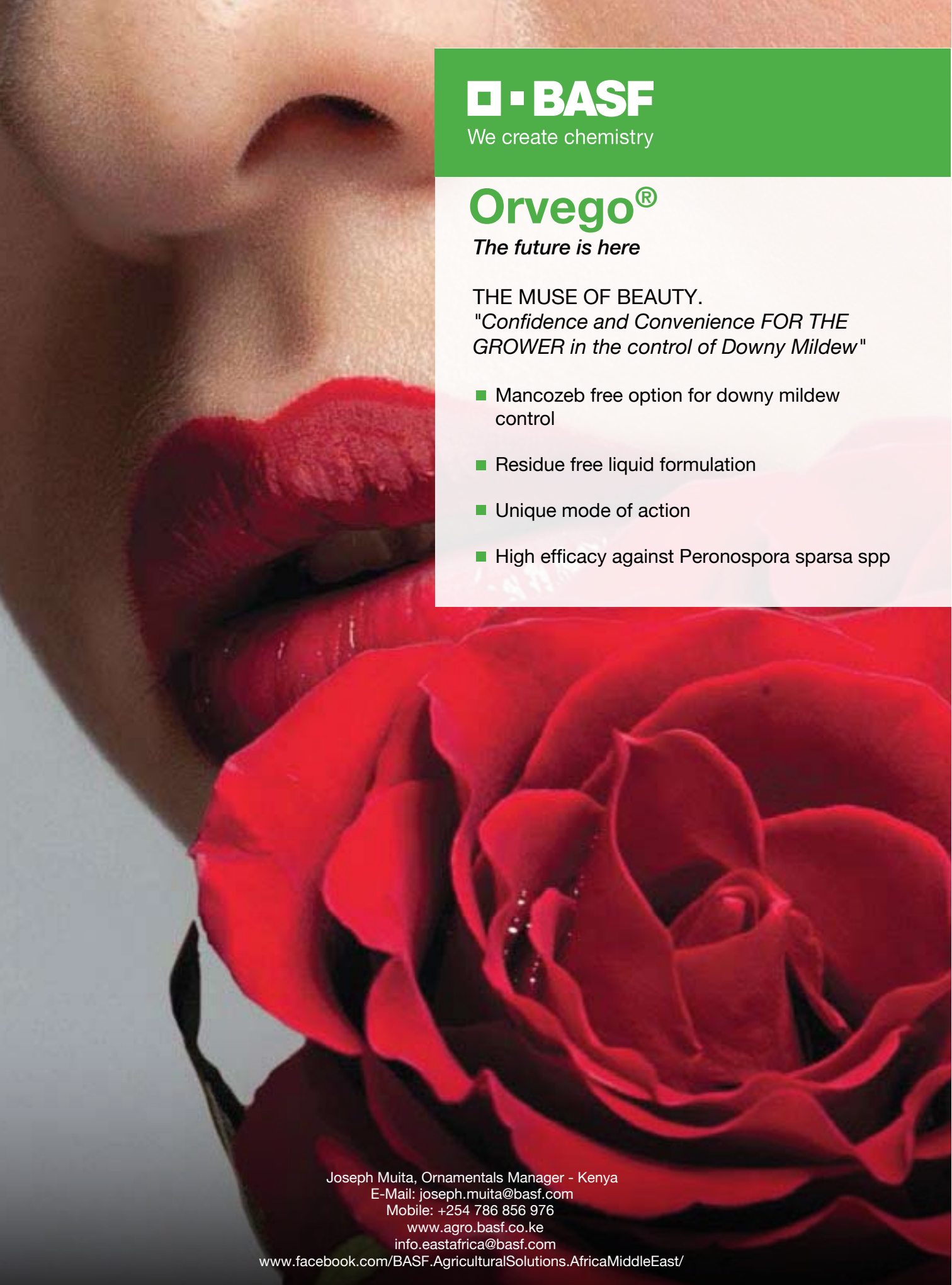

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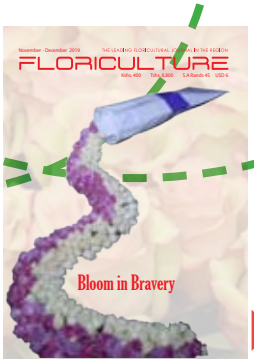

Cover: Courtesy of Kenya Flower Festival

The Leading Floriculture Magazine

Floriculture is published six times a year and circulated to personnel in the Horticulture Industry, foreign missions and Kenyan Embassies abroad, Flower Growers, Exporters and Consumers, extension officers in the Ministry of Agriculture and counties, research offices and suppliers of agricultural inputs in Kenya.

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ADDRESS CASH FLOW CRISIS

The past few months included momentous and almost unimaginable floricultural sector developments. What began more than two years ago with high cost of production making Kenya uncompetitive in the market place, has become a cash flow storm of historic proportions—engulfing almost every flower farm. In this we call the government to come up with sweeping actions to head off wider sector disruptions, including plans to cushion cost of production and VAT refunds. There is need to address:

First, what are the macroeconomic implications of this sectoral storm for the country economy, in combination with the major commodity market shocks of the past year, and the retail downturns emerging? There is a consensus today that the country economy is set to weaken further. Already, growth is slowing in both service and manufacturing sectors. Looking forward, a key issue is whether the slowdown will be shallow and will be followed by a gradual recovery, or whether the downturn will be deep and protracted.

Second, what can policies do to help to navigate the storm and to chart a course that would restore the financial system and support economic activity, while keeping inflation at bay? The challenges are daunting. As recent developments suggest, many of the policy actions taken previously in the event were not sufficient to achieve these basic goals.

Policymakers' first priority must continue to be the restoration of market functioning, forestalling the spiralling crisis of confidence among financial market participants. The unprecedented policy responses of the past—principally, but not exclusively, in the sector —have demonstrated that monetary and fiscal authorities are willing to implement innovative and unorthodox measures when they perceive that they are necessary.

Masila Kanyingi
Editor

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Neonicotinoids Also Poison Beneficial Insects Via Honeydew

Marcel Dicke

Neonicotinoids can also be harmful to beneficial insects through honeydew. It was already known that this group of insecticides could reach bees via nectar and pollen, but this happens only when the crops are blossoming. Honeydew, however, is available all year round.

The debate regarding side effects on beneficial insects is mainly held concerning bees, but it also affects many other species of beneficial insects. Marcel Dicke, professor of Entomology

Neonicotinoids are the most widely used group of insecticides worldwide.

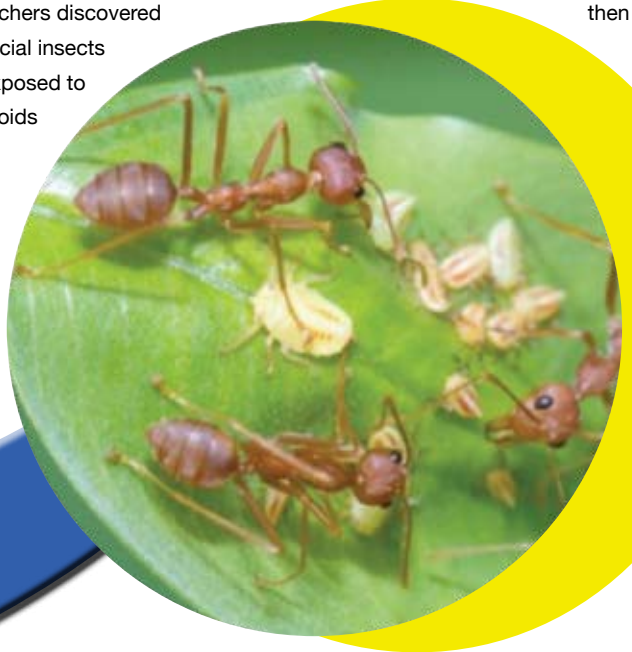
They are used to combat harmful insects that eat plants, for example. ‘Recent studies have shown that insect populations are declining rapidly’, says Marcel Dicke, professor of Entomology. ‘An important question is how much of a role the insecticides play in this. The debate regarding side effects on beneficial insects mainly concerns bees, but it also affects many other species of beneficial insects. The effects of these insecticides are probably much further reaching than thought previously.’

Study

The researchers discovered that beneficial insects are also exposed to neonicotinoids via honeydew, which is a sweet fluid produced by aphids, mealybugs and whiteflies, amongst others, and is an important food source for many insects. The study was conducted by researchers of WUR, the Instituto Valenciano de Investigaciones Agrarias and the Universitat de València and is published today in the prestigious journal Proceedings of the National Academy of Sciences of the United States of America (PNAS).

Honeydew

The researchers treated orange trees with two different commonly used neonicotinoids. They then introduced mealybugs, which



produce honeydew, on the leaves. ‘If the plant has been treated with neonicotinoids, the mealybugs will ingest it through the saps, and the neonicotinoids will then also end up in the honeydew’, Dicke explains. Chemical analyses showed that the Neonicotinoids were indeed present in the honeydew, and the researchers observed that parasitic wasps and hoverflies perished after they had ingested the honeydew.

Lingering effect

‘This already happened with treatment at half the concentrations of those normally used’, Dicke adds. According to him, this could mean that the effect also occurs long after the plants have been treated. ‘At a high concentration, many of the mealybugs perish before they can produce a lot of honeydew. So the effect will initially not be as noticeable. But neonicotinoids remain in the plant and even in the soil for a long time, and a lingering effect can be expected once the concentrations in the plants decrease.’

It is important to develop new methods to protect crops. This requires a different mindset.

Global risk

In 2018, the European Commission banned three neonicotinoids from use in open crops. This decision was made following the many studies that showed that these substances are harmful to pollinating insects such as bees. Dicke: ‘There is ongoing discussion regarding this, because farmers argue that it could be applied outside of the blossoming period or on crops that do not bloom. Until now, the deaths of beneficial insects through exposure to honeydew had not been included in the risk assessments, because people had not realised that this could also play a role.’

Neonicotinoids are used around the world on crops that contain many honeydew producing insects, such as aphids and mealybugs. ‘It is important to develop new methods to protect crops’, Dicke says. ‘I would suggest measures such as straticulture with crop diversity, which creates a diverse insect stock and the presence of natural predators, or the use of insects for biological control. That transition is not always an easy one, and it requires a different mindset, but there are plenty of possibilities.’

So are the arguments for the ban on neonicotinoids weak?’

From 1 January 2019, farmers are no longer allowed to use the insecticides imidacloprid, clothianidin and thiamethoxam – the neonicotinoids – out of doors. They are harmful to birds and bees, the EU has concluded. Farmers and the chemicals industry are angry and are threatening to go to court. Hilfred Huiting, a researcher at Wageningen Research in Lelystad, thinks they have a point.

Is a ban really so terrible for farmers?

‘There is a solution for everything, but the question is whether some crops will still be viable in the short term once farmers are no longer allowed to use these pesticides. That applies to sugar beet and certain vegetables such as cabbage.’

But the ban is good for nature, isn’t it?

‘That is debatable too. Now, sugar beet seeds are often coated in neonicotinoids. That protects them well against pests, and the insecticide is only toxic to insects that eat the plant, because the crop is not pollinated by bees or bumble bees. Soon a lot of farmers will spray their crops with other insecticides several times a year. That is damaging not just for the insects that eat the plant, but also for insects flying around nearby. Politically, I understand the total ban, but scientifically, I don’t think it is backed up by good arguments.’

Aren’t there any other, more environmentally friendly alternatives?

‘Oh yes. For some crops, such as maize, these neonicotinoids were banned a few years ago. There are good alternatives for those crops. Sometimes the alternative is different pesticides, sometimes it is a different management strategy. For example, click beetles in maize can be controlled well by ploughing over the soil at the right moment in the year. That kind of option is often a partial solution, whereas neonicotinoids are an off-the-shelf solution. Those partial solutions require a lot of knowledge and we don’t have that for every crop, by any means. Not enough has been invested in that recently, either.’

Can we expect to see that investment now?

‘A ban does stimulate the development of alternatives. So maybe it will turn out to be a good thing in the long term. But try telling that to a farmer who faces serious problems now.’

Molo River Farm Wins Spear of the Nation Award

The Export Promotion Council (EPC) held the 1st inaugural Kenya Exporter of the Year Awards (KEYA) on 15th July 2019 at KICC aimed to recognize firms that have made significant contribution to the development of the economy through exemplary business performance.

Export promotion council recently organized Kenya Exporter of the Year Awards (KEYA) to give props to the best in the export sector. To achieve recognition, participating companies were tasked to meet world class status in different aspects of their businesses. Leadership and corporate governance came top of the list in the assessment guidelines; this was to establish the positioning of participating companies for future growth and sustainability. Marketing and customer focus, financial and revenue generation practices and ICT adoption were among the determinants used for recognition.

Molo River Roses Ltd met the required threshold to emerge among the top by winning two exceptional awards. Spear of the nation award and excellence based award are the two accolades the company claimed. It is noteworthy to say, the flower farm couldn't have achieved such a milestone were it not for a great deal of synergies created between the farm, their suppliers and the staff.

For more than two decades Export Promotion Council (EPC) has been committed to advocacy of exporters and producers of export goods and services. Establishment of KEYA provides a platform for exporters to gain recognition for unparalleled contributions they have been making to the country's economy not overlooking their role in promoting the brand Kenya in different foreign countries which import our flowers.

The Awards Ceremony was marked with pomp and color with His Excellency the Deputy President Hon. William Ruto presiding over the Ceremony accompanied by Cabinet Secretary Ministry of Trade, Industry and Cooperatives Hon. Peter Munya, Permanent Secretary State Department for Trade Dr. Chris Kiptoo, Permanent Secretary State Department for Industry Betty Maina amongst other dignitaries.

The Kenya Exporter of the Year Awards (KEYA) is a scheme that seeks to recognize and encourage outstanding export performance by individual exporting enterprises. The excellence-based award is built on seven key determinants in the assessment tool that participating companies are evaluated on. This include; leadership and corporate governance, marketing and customer focus, finance-revenue growth, GDP contribution and foreign exchange earnings, information communication technology an e-commerce adoption, product quality, processes and certification, human resource management, and sustainability.

Wealth of Creation: Different Flower Arrangements

From the Desk of Rosemary Kimunya

Bloom in Bravery

We are pleased to have you at the first ever Kenya Flower Festival. Kenya Flower Festival was borne from a passion for flowers, and an observation that the language of flowers sounded foreign to most of us Kenyans yet Kenya is the lead exporter of roses to the European Union, where it currently commands a market share of about 38 percent.

This, however, is not reflected in the local consumption. Kenya started producing flowers in the early 1980s yet the local demand for flowers remains low. As we have engaged with professional florists, who happen to only be a handful in the country, our concern has grown because we actually import artificial flowers to supplement the local demand for flowers during functions such as weddings, baby showers, bridal showers and birthday parties. In addition, there is no designated outlet for cut flowers in Nairobi despite the growing demand from Kenya's middle class.

Education and the inculcation of a culture of appreciation for fresh flowers will, in the long run, increase the demand for flowers. Sadly, many flower farms are sceptical about local consumption and prefer exporting flowers because of the great demand outside the country. I believe that all this starts with us. In addition, the flower industry has been in a lot of distress. Many flower farms are struggling and some, like Finlays, have been forced to close a number of their farms. We, as Kenyans, managed to save our tourism sector by embracing local tourism. Isn't it time we did the same for our flower industry? We can make flowers an everyday affair: plant them, give them, and so on. Can you imagine a world without flowers? A world without beauty?

This event is just the beginning and we are looking to host annual flower exhibitions locally to create demand for our flowers. We are excited to be partnering with the flower farms through Kenya Flower Council today and we hope that this spills over to subsequent events. We are hopeful that we will have more florists and floral designers showcasing their pieces of floral art and skills in future events. Our dream is to establish a flower gallery where we get to showcase our beautiful flowers and promote flower tourism in Kenya. We cannot do this alone which is why we are partnering with the Kenya Flower Council and government ministries to create demand locally for flowers from flower farms.

As we mark this event today, I would like to express my sincere appreciation to everyone who generously helped put this event together. All our partners Exhibitors, flower growers we couldn't have done it without you! The theme this year is Bloom in Bravery. It is in support of the Breast Cancer Awareness Month and is a way of celebrating, showing support for and honouring breast cancer survivors, as well as those who continue to battle the disease. Flowers come in handy to express our emotions and lift the spirits of those who are unwell.

Manuchar Kenya Ltd

"We keep your production running; anytime, anywhere."

Manuchar is a global trading, logistics and distribution company headquartered in Antwerp, Belgium. It operates in more than 140 locations with enormous investment in more than 50 countries, especially in emerging markets.

The company's trading activities ranges from; chemicals, steel, polymers, spare parts, paper, wood, cement and water soluble fertilizer. Their distribution and local added value logistics unit focuses mainly on commodity chemicals. This line of business has bolstered Manuchar's presence in Latin America, Africa and Asia; which they are currently topping amongst the leading three distributors in the regions mentioned above.

Manuchar's global presence has given the company a leg up in servicing their clients consistently. The networks and partners accumulated by the company over the years in China have been really necessary in production of quality products. This kind of solid foundation gave the company the right capacity to explore and invest in emerging markets and today they boost of being the right partner in emerging markets with 25 years of experience.

Water Soluble Fertilizers

While at a family dinner, the Country Manager of Manuchar Ecuador listened keenly to the challenges his uncle was battling in the flower farm. He pointed out that unsteady supply of water soluble inputs and hiccups on importation escalated the cost of production causing financial constraints and making the business unprofitable. Tapping into this problem; he noted that Manuchar's strength in its chemical unit could be the right synergy to fuel the fertilizer business.

Fast forward he reached out to the head office in Belgium and they followed up on the idea, piloted it in his uncle's farm and went ahead to implement the business of water soluble fertilizer in Latin America in 2009.

Inspired by the growing population in emerging

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Nairobi – Kenya

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markets; which has created the need for sufficient and quality nutrition, Manuchar has expanded to different countries in Latin America, Africa and Asia. Manuchar started trading in Kenyan market in 2010, at the time selling industrial chemicals (detergents and cosmetic products). Guided by a detailed market study, Manuchar made the decision to bring its fertilizer business into the Kenyan market in 2018 to compete and also provide a viable option for Kenyan growers to choose from.

The fact that Manuchar's investment in water soluble fertilizer was inspired by problem in a flower farm, gives them the rights to practically promise you as grower that they are "all in for your flowers".

Leveraging their synergies in logistics, personnel, presence and operation for more than 25 years in emerging markets; Manuchar technically have the know-how to deliver quality and reliable water soluble inputs at the right time to ensure production of flowers moves on swiftly without any hiccups along the way.

Manuchar's Business Approach

The company strongly believes and values long-term partnerships aimed at building sustainable and viable businesses. To achieve this, Manuchar systematically invests in infrastructure and teams at strategic locations in emerging market. It is their conviction that local presence and proximity are two essential factors to develop lasting relationships.

The company's approach to quality in their products is unparalleled. Flower growing is a delicate business, which you cannot afford room for mistakes or compromises at any stage. Manuchar understands this better than anyone else from their vast experience with a flower farm in Ecuador mentioned earlier. Their commitment to subject its products to quality checks three times every year gives customers all the assurance they need and makes Manuchar the right development partner as they are with you for the long haul. Quality assurance team in Belgium are committed to traveling multiple times every year to their manufacturer's site to check on quality of the products at the factory to confirm that it is indeed unquestionable. This commitment goes a long way in ensuring that Manuchar sells top notch products to every customer around the globe.

Affirming their strategy of local presence and proximity; Manuchar's warehouses are situated at convenient locations near the airport where growers can pick their fertilizers on their journey back from delivering flowers. From this therefore, ease of access and availability of fertilizer whenever the customers procures is what guides the company to ensure they deliver above and beyond the clients' expectations.

Product Range

No.	FERTILIZER	Packaging
1	Calcium Nitrate	25 kg bags
2	Magnesium Sulphate	25 kg bags
3	Magnesium Nitrate	25 kg bags
4	MKP	25 kg bags
5	MAP	25 kg bags
6	Potassium Nitrate	25 kg bags
7	Potassium Sulphate	25 kg bags
8	Hydrogen Peroxide 50%	30kg Drum
9	Nitric acid 68%	35kg drums
10	Phosphoric acid 85%	35kg drums

Conclusion

As a grower, it is a good business practice to integrate sustainability in all your farming activities. Sustainable farming breeds profitability while looking out for the environment and people. To achieve this goal, you need the right partners to help you in this quest; competitive crop protection, agronomic services, financial partners just to name a few. All these partners ought to play their role diligently to help you as a farmer achieve your objectives.

Manuchar is such a partner which offers you top notch water soluble fertilizers whenever you need them, at the most competitive prices. Reach out to Manuchar and start your journey towards sustainable farming today.

The Ultimate Flower Protection

Innovative Chemistry
Infinito is a fungicide combining the innovative active ingredient fluopicolide with the established power of propamocarb. The two active ingredients compliment and support to deliver the ultimate flower protection. Representing a new chemical class, the acylpicolides, fluopicolide introduces a completely new mode of action. Its unique characteristics work in synergy with the proven capabilities of propamocarb-HCl, a carbamate, to set new standards in performance against the oomycete pathogen Peronospora sparsa. The result is a fast-acting, long-lasting product, active against all key stages in the pathogen's life cycle to provide outstanding defense throughout the crop cycle.

New Mode of Action
Fluopicolide works by disrupting the formation of spectrin-like proteins that play a vital role in maintaining the pathogen's cytoskeleton stability.

Built-in Resistance Management
Combining the complimentary modes of action of two active ingredients, provides growers with a powerful new tool to counter resistance development. Their different modes of action bolster the product with a solid inbuilt anti-resistance mechanism.

Application rate
1.2- 1.5 litres per hectare

Perfect Coverage
Infinito formulation technology produces complete and even distribution of the product on leaves, stems, and petioles. Small droplets with excellent sticking properties cover the upper and lower surfaces of the leaf, un-hindered by leaf hairs. After drying, fluopicolide particles are evenly distributed to provide complete protection against the pathogen.

Fast Uptake
Full protection is achieved on the day of application, through its contact and systemic action. The propamocarb moves quickly into the leaves and stems taking some of the fluopicolide dissolved in the spray solution with it.

Long Lasting
The even distribution of fluopicolide particles provides a reservoir of product to protect the leaf surface against further infection. Fluopicolide persistent uptake into the leaf and stems throughout the spray interval maintains a high level of protection. Fluopicolide has strong translaminar absorption.

Weather Independent
Infinito adheres firmly to the leaf even when the surface is wet with dew or recent spray. Once dried on the leaf, the product remains fixed and resists wash-off by follow-up sprays.

Conclusion
Infinito provides the robust foliar protection and strong anti-sporulant activity. In addition, it brings all the performance features needed to deliver the ultimate flower protection:

- Leaf and stem protection
- Strong translaminar and anti-sporulant activity
- Activity at every key stage in the pathogen's life cycle
- Fast and long lasting action
- Effective under all weather conditions
- Built-in resistance management
- Favourable environmental and toxicological profile
- Excellent crop safety
- Low dose rate
- Easy to use liquid formulation

Why Integrated Pest

We need to continue to move more pointedly from an emphasis on tactics to an emphasis on how to use tactics, which has direct implications for selection pressure and therefore for sustainable pest management.

Management is Due For a Reset

Whatever happened to integrated pest management?

If you're a regular reader of Entomology Today, you might think "Why, I didn't know anything had happened to it." So, why is anyone even asking this question?

It's true that integrated pest management (IPM) is a term well known. It is used liberally by scientists and other practitioners without the need for definition, and it is a major success story for society. But it can also be argued that IPM has, in fact, lost its way.

There has been little formal discussion of IPM theory and its status over at least the past 10 years, even though in that time we have seen both the overwhelmingly successful adoption of prophylactic pest control tactics in the form of transgenic crops and seed treatments and the increasing application of evolutionary biology in environmental and public health management.

The time has come to revisit the foundations of IPM and look deeply at its conceptual aspects and future development. To that end, in a forum paper in the latest issue of American Entomologist, my colleagues Leon G. Higley and Larry P. Pedigo and I present our case for a conscious evolution of integrated pest management. The article is provocative and therefore it is meant to generate further discussion in the entomological profession, and we hope you'll read it, but here I'll share a brief synopsis of our specific recommendations:

Initiating new dialogue and research on the central tenets of IPM, especially evolution.

Evolution holds a central place in pest management, yet its role in IPM has received relatively little attention. This is ironic because a chief impetus for the development of the integrated control concept in the mid-20th century was the reality—indeed, inevitability—of arthropod resistance to insecticides.

Managing pest resistance to tactics that impose strong selection pressures necessitates the need for applications of evolutionary biology, such as reducing phenotype–environment mismatches (i.e., when a population's phenotypic trait distribution differs from the environmental optimum) and incorporating combinatorial approaches to sustain management of pests. We argue that IPM has a clear role to play here, provided that it is firmly connected to ecology and evolution.

Replacing control with management.

If we are to more formally and more completely incorporate evolutionary considerations into IPM, the emphasis needs to shift broadly and resolutely from killing pests to managing host stress, where possible. Control implies a heavy-handed program focused on the pests themselves, whereas management encompasses reducing host injury to tolerable levels in addition to modification of pest populations.

Thus, we propose an updated definition of pest management: "a comprehensive approach to managing host stress that is economically and ecologically sustainable." This is similar to past definitions but additionally benefits from a focus on

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the concept of managing host stress as a way to incorporate evolution more formally in IPM. In our context, a host is the receptor of a pest's activity or injury, so it can include plants or animals, including humans.

Initiating host breeding programs specifically to breed for tolerance to pest injury.

We need to systematically incorporate tolerance of pest injury into pest management programs. Tolerance, whether as a type of resistance or as an important concept of economic injury levels, ameliorates selection for pest resistance to tactics. We acknowledge, however, that breeding plants to be tolerant to pests is much easier said than done.

Emphasizing how to use tactics and de-emphasize the focus on tactics themselves.

We need to continue to move more pointedly from an emphasis on tactics to an emphasis on how to use tactics, which has direct implications for selection pressure and therefore for sustainable pest management. This focus has been largely overshadowed by the discovery of tactics and what we call the "have-technology-will-use" syndrome. Instead, by focusing on how to use tactics, we can ensure that we are incorporating evolutionary considerations into IPM. Current approaches to resistance management for antibiotic drug use in public health, for example, as well as for Bt crops in agriculture, have relevance for IPM.

Recommitting to and updating Kogan's levels of IPM adoption.

In 1998, Marcos Kogan argued for three levels of IPM implementation as a way to encourage progression along increasing ecological, socioeconomic, and agricultural scales and complexity. We recommend that this scheme be used to reinvigorate IPM but also revised to incorporate our recommendations, such as by substituting "management" for "control" and added additional agricultural, socioeconomic, and ecological scales, among other changes.

We conclude the paper with a call to action: Our suggestions require a commitment to thinking about—and acting on—pests as part of the management of a system, with the host being central to that system. This is in contrast to the more common approach of focusing on the pest as the entity to be controlled.

Although it comes with numerous additional challenges, we should be adaptively managing agroecosystems, urban ecosystems, and natural ecosystems, not attempting to control one or a few organisms within these systems.

PEST ALERT

FALSE CODLING MOTH (FCM)

One of the pest challenges currently facing flower producers in Kenya is the false codling moth (FCM), *Thaumatotibia leucotreta*. Growers have suffered financial losses due to quarantine restrictions and detection of a single larva can result in rejection of an entire consignment.

For proper control of FCM, 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.

Current control of FCM in ornamentals consists of chemical application with Karate Zeon and Match, mating disruption using pheromones and biological control methods.

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Fake Pesticides:

Authenticated Solutions for Agriculture in the whirlpool of large and niche market

The Agriculture Industry, which is the backbone of our economy, is facing multiple threats from the growth of fake pesticides. According to a latest study conducted, the fake pesticides industry in India was estimated at billions of US dollars globaly, which account for 25 per cent by value and 30 per cent by volume of the domestic pesticides industry . The Study indicates that this market is expected to grow at the rate of 20 per cent per annum in terms of value, and if not addressed, can reach to approximately 40 per cent share by value in the pesticides industry by 2019. The problem is extreme in many countries including Kenya.

Consequences of Counterfeit pesticides:
The Contribution of agriculture sector in the GDP is already declining. This trend is worrying and will create a natural stretch on the agriculture sector in the future.

The growth of spurious is adding fuel to the fire as Kenya has suffered a loss of tons of food grain production. In light of this, Kenya's position as food sufficient country and exporter in the world is also at stake. There is no denying that the damage through such products is multi-fold and the counterfeit pesticides pose a significant threat to various stakeholders

These include:

Farmers: Risk of life & valuable crop loss: Various cases of farmers committing suicide due to loss of crops have been reported by the media. Although there are various reasons for the loss of crops, the involvement of fake pesticides can't be ignored or denied. Spurious pesticides are known to damage the crops resulting in a decreased yield or at times, even destroying a field.

Consumers: Risk of Health
Counterfeit pesticides pose increased risks to consumers through unknown and untested residues. Unlike legal, registered products, spurious pesticides could contain unknown toxic impurities and have not been tested for human health impact. Residues of unknown and untested substances could get carried into harvested food and compromise consumer health, whilst also posing health threats to farmers through exposure during application. A

pesticide residues in the exported produce. Kenya officials say such cases result from the overuse of chemicals. Not only this, the government loses not just the tax revenue but also its prestigious goodwill and reputation.

number of people have died after they consumed contaminated food containing monocrotphos pesticides.

Government: Risk of reputation, export and economic damages

Increased cases of spurious pesticides make the public lose their confidence in the government's ability to regulate the agriculture sector effectively. Yearly, Kenya exports millions of flower stems and tons of fruit and vegetables. In such a scenario,Kenya's position as one of the leading fresh produce exporters in the world is also at stake as there is increased possibility of rumours or sabotage by other countries or rejection of Kenyan exports goods items from developed countries.

In recent years, the European Union temporarily stopped buying some varieties of vegetables from Kenya after detecting

Industry: Loss of sales and reputation

Due to the presence of counterfeit pesticides, the farmers lose faith in legitimate products and companies, which result in loss of reputation and customer trust. Also at stake are the Kenyan crop protection industry, along with the Food Retail industry.

Environment risk

There is high risk of environmental contamination and adverse effects on groundwater, following crops and biodiversity. Firstly, the production of counterfeit products may subvert environmental regulations leading to the production processes and waste contaminating the land, air and water. Secondly, the use of counterfeit products, such as pesticides, may cause severe crop and environmental damage. Thirdly, the destruction of counterfeit products can result in more landfill waste or toxic fumes from incineration.

Types of counterfeit Pesticides To fight any type of counterfeit activity, one needs to first understand the nature, extent and reasons behind the increase of such activity in various sectors as it varies by market and can originate from many different sources in different forms. The three main forms of counterfeit pesticides are;

Fake pesticides

These products are often sold in simple packs (white bottles) with minimal information on the label about their use and no mention of any health or environmental precautions. They contain anything from water or talc, to diluted and outdated or obsolete stocks, including banned or restricted materials. Some fakes also provide a degree of biological control, as they sometimes may contain an illegal and untested copy of the proprietary active substance.

Counterfeit of genuine branded products

These are sophisticated copies of legitimate branded products usually with high quality of labelling and packaging. Most contain a copy of the original active substance; however, its biological efficacy is often diminished owing to high level impurities of manufacturing and process by-products. Such products are often difficult to be distinguished from the genuine ones. Mostly, farmers are fooled into buying them unknowingly in absence of proper education and awareness.

In various cases, counterfeiters purchase genuine, empty bottles from the farmers on as high as 25 per cent of the M.R.P. mentioned on the original bottle. This way, the counterfeiters put substandard ingredients into the bottle and resell it.

Illegal Parallel imports

These are legitimate parallel traded products substituted with illegal generic copies, repackaged and sold as legitimate products. Reasons behind increase of counterfeit pesticides of counterfeit pesticides The problem is increasing because of various factors like;

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(Left): Fake Product.
(Right): Original Product from Lachlan. companies are investing hugely to protect their original brands

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Difficulty in identification of fake products with legitimate one due to lack of awareness

In Kenya, majority of the farmers are of moderate education and there exists a lack of education and awareness at the farmer level. Only 25-30 per cent of farmers are aware of the correct use of pesticides. Many do not ask for specified chemicals or brands and often ignore if specific details are not available on the products. Ironically, even though the food manufacturers and producers are consumer-oriented companies, they do not speak publicly about this problem. Many food companies do recognize the challenges but prefer to resolve these quietly and directly with their suppliers.

The main disadvantage of this practice is that it does not bring the problem out in the open and consequently thousands of food producers remain uninformed about the existence of this grave issue and thus how to deal with it. It is important that farmer organisations and Co-ops play a leading role in increasing awareness about the risks of using counterfeits.

Lack of monitoring and surveillance

In Kenya, the responsibility of enforcement is divided between the regional and national authorities but the political divisions and sensitivities have led to weak enforcement coordination and action. At national levels, this requires multi-disciplined specialists' teams with skills in policing and prosecution, chemicals, agriculture, customs, environment, etc. These skills are available, but more often than not are not working together.

Focus on high-Profile sectors

National anti-counterfeit activities tend to focus on high profile sectors where the VAT losses are longest (luxury goods, CDs, clothing, software, pharmaceuticals). Less high profile sectors like farmers do not get the requisite resources-despite the acute environmental and health threats posed by counterfeit pesticides.

Inadequate judicial frameworks and penalties

Kenya does not have adequate legislation

to properly prosecute counterfeiting. For example, in some countries, it is illegal to buy or sell counterfeits, but not to possess them. Other countries have inadequate penalties. In some cases, a convicted counterfeiter found in possession of hundreds of tons of illegal pesticides is only given a very small fine compared to the damage.

Challenges of quantifying the problem

It is difficult to present detailed data of the extent and growth of the problem because of its illegal nature. This is the same problem encountered by all sectors who face counterfeiting. Even in areas where judicial authorities devote significant resources, like illegal cigarette smuggling or narcotics, the estimates of the size of the problem vary wildly.

Role of authentication Solutions in fighting this menace

Counterfeiters today are tech savvy and can easily produce packaging material similar or better than that of genuine products. But, if there is a problem, there are solutions. Technology-based solutions could be one of the strategies to counter the problem. Various studies and scholars have attempted to propose technology-based solutions to combat fake agro-inputs products in the supply chain. The Proven adoption of these technologies by some countries can be treated as case studies.

These authentication solutions have multiple benefit as they provide

1. Tamper proof packaging;
2. Product authentication and
3. Tracking and tracing of product

Proposed solutions for Kenya.

In Kenya, farmers do not have any tool/ medium to differentiate genuine pesticides from fake ones at the time of purchase. Due to lack of awareness and illiteracy, they rely on the visual appeal and can only check the quality of products with the marking of KEBS. However, with the advancement in digital technology, it has become easy for unethical manufacturers to produce fake KEBS product as well. Farmers only come to know about counterfeit pesticides after there has been a loss of crop or field. However, until that happens, there is no way to analyse the contaminants in the fake products as the farmers apply them in all of their crops, or use up the packing materials. Therefore, there remains a constant need to spread awareness on 'How to identify genuine pesticides from the fake ones?'

The usage of authentication technologies on pesticides products can be great help to the farmers and authorities, not only in identifying the fake products but in identifying the counterfeiters involved in the fake pesticides' business as well.

Further, the government authorities can use anti-counterfeiting devices comprising of overt, covert and forensic security features. Example of such tools are security hologram seal and labels, tamper evident security film, low cost transponder tags, and light sensitive ink designs. Integrated with track and trace technologies, these solutions can help farmers and enforcement authorities in identification of genuine and fake pesticides.

All these anti-counterfeiting solutions (label) can be linked with the database of our Kenyan Government PCPB. Accordingly the Kenyan Government, can have a toll-free-number where farmers register. The farmers can easily check the originality of pesticides by giving a missed call or SMS at the toll-free number by confirming the unique number printed at label. A message is then sent to each farmer in his preferred language and contains information about the pesticide's batch number, expiry date and originality.

Conclusion

Adopting authentication solutions is a win-win situation for all the stakeholders; as the brand owner and the authorities enjoy the revenues and tax/duties respectively and the consumer has access to the original product. These authentication solutions also help the end consumer to identify a genuine product in turn winning his loyalty and boosting the brand value.

Some associations are committed to educate stakeholders about the adoption of authentication solutions and conducting series of workshop for professional involved in farming, tax revenues, supply chain management, quality & product packaging providing them information on importance of authentication solutions in fighting fakes. Stake holders must review consumer experience, role of Government, overview of current authentication technologies to evolution of new generation technologies in fighting counterfeiting.

Early Detection is Key

In any case, it is important to be able to recognize the damage that results from the feeding of particular insects so that management strategies can be applied before the damage becomes extensive, or preventative steps can be taken.

Scouting and Early Detection

Early detection is one key to successful insect management on cut flowers. Insecticide treatments are rarely 100% effective. Regular and careful observation of the plants will help detect pest problems as they are just beginning. In greenhouses and high tunnels, yellow sticky traps may serve as a useful tool for whitefly, thrips and fungus gnats and outdoors for detecting migrating leafhoppers. Place traps among the flower crops checking them weekly to determine what pests may be present and as an indicator for the effectiveness of treatments. Plant foliage may be tapped over a white sheet of paper to look for mites and thrips. A sweep-net can be used to capture plant bugs and leafhoppers.

Insect Management

The best approach to both disease and insect management begins with good sanitation and soil management. Keep the field free of weeds and plant debris. Adjust soil fertility and pH based on soil tests and space plants to allow sufficient air circulation within plantings.
When using a pesticide, good spray coverage is important. Unfortunately, not all of the material you apply actually reaches the target insect. Therefore, even small changes in spray distribution and delivery can have a large impact on success or failure.

Many insects look similar but are very different in their biology, habits and controls. A wrong identification can result in choosing the wrong pesticide or management strategy and obtaining poor control. Things like pesticide selection and placement, cultural practices, and frequency of treatment all hinge on proper identification.

Most damaging pests are apt to attack a wide variety of plant types while a few are specific to a limited number of hosts. In any case, it is important to be able to recognize the damage that results from the feeding of particular insects so that management strategies can be applied before the damage becomes extensive, or preventative steps can be taken.

Insects Causing Damage by Chewing

Pests with chewing mouthparts feed on all parts of the plant. These pests tear or cut, then chew and swallow bits of tissue leaving a ragged leaf or flower margin in the process. The tissue is removed mostly from the outer margin inward. In severe cases, most of the leaf may be eaten, in other cases, the insect may not be able to chew completely through the leaf

Insects with piercing-rasping mouthparts do not chew plant tissue. They pierce the leaf, flower, roots or stem with sharp, needle-like structures. Once these structures are inserted into plant tissue, the insect pumps liquid such as sap into its stomach. At the same time a salivary liquid is pumped into the plant to facilitate food withdrawal. In some cases the saliva may cause a toxic reaction in the plant. This process of feeding also accounts for the fact that insects with piercing-rasping mouthparts can transmit viruses and mycoplasm- like organisms to healthy plants.

Damage caused by piercing-rasping insect may show up as small specks or chlorotic spots where the plant or flower was punctured. Others cause twisted, curled or deformed plant or flower growth, largely because of the introduction of the toxic saliva. Still others cause general wilting which may eventually lead to plant death. Occasionally, leaves may have holes as a result of damaged tissue that has dried, become brittle and fallen from the leaf.

surface and the result is a lacy appearance to the damaged leaf.

Some chewing pests prefer only the tender interveinal tissue; a skeleton of veins is all that is left after attack. Since chewing pests feed on large quantities of leaf or flower tissue, apply an appropriate pesticide on the leaf or flower surface so that the insect will ingest sufficient residue to be killed. The following is a description of some common chewing insects that are known to cause damage to cut flower crops.

Caterpillars.

Several species of moths and butterflies are pests of cut flowers. One of the most important is the variegated cutworm. Larvae hatch from eggs layed in the spring and generally feed after dark. Plants may be cut off at or near the ground overnight. Some species of cutworms also climb and feed on the foliage. A single cutworm can kill several plants in a night. Newly planted annual flowers are most vulnerable. Other damaging caterpillars include beet armyworms which may bore into flower buds and defoliate plants.

Insects Causing Damage by Piercing-rasping

Perhaps most damaging although not as apparent, are insects and insect-relatives that pierce plant juices. Thrips, aphids and mites are the most common.

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Because these pests do not consume any of the plant surface, stomach poisons on the surfaces of plants don't work very well. In this case a systemic pesticide, one that enters the plant system so the insect picks up the pesticide as it feeds or a contact insecticide may work best. Insecticidal soaps have contact activity but must be come in contact with the pest because they have no residual activity.

Some insects are capable of transmitting diseases from infected to uninfected plants. The most important ones here are aphids.

Thrips

Thrips is a common pest on outdoor cut flowers and this pest has rasping-sucking mouthparts. This describes feeding with both piercing-sucking and chewing mouthparts. Thrips puncture the tissue, then sucks the sap and fluid that is released from the injured tissue.

Thrips are very tiny, (about the size and shape of a grass seed), cream to dark colored insects that prefer to feed in opening leaf and flower buds. Some species will feed on leaf tissue where they produce silvery depressed areas that frequently contain black specks. Thrips will attack many cut flowers. Feeding damage appears as a dull discoloration. Flowers can be streaked, mottled or flecked with off-color areas. In some cases new growth may become misshapen and deformed, or buds may fail to open. Thrips also transmit impatiens

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necrotic spot virus (INSV), a serious disease in the greenhouse industry. The potential exists for INSV to cause problems in cut flower production also. Insects with rasping-sucking mouthparts make them vulnerable to insecticides with systemic and contact activity. Since thrips prefer to feed in tight, protected places such as expanding flower buds, multiple applications of insecticides are often necessary for adequate management.

Aphids

Aphids can occur in large numbers very quickly. Most aphids are about 1/16-1/8 inch long, rounded or almond shaped with two “tailpipes” cornicles at the rear of the abdomen. Apart from the damage they inflict directly by removing plant juices, they also are effective vectors of many virus diseases. Plants can generally cope with small numbers of aphids. However, during high temperautre, aphids have the capacity to multiply rapidly and cause extensive damage.

Mites

Two spotted spider mite, cyclamen mites and broad mites are three mite species that can cause problems in cut flowers. Two spotted mites are most active on the underside of the leaves, their presence being apparent by the fine stippling caused by their feeding and seen on the upper surface of the leaves. Fine webbing is produced by the mites. Leaves turn yellow or bronze, and many drop.

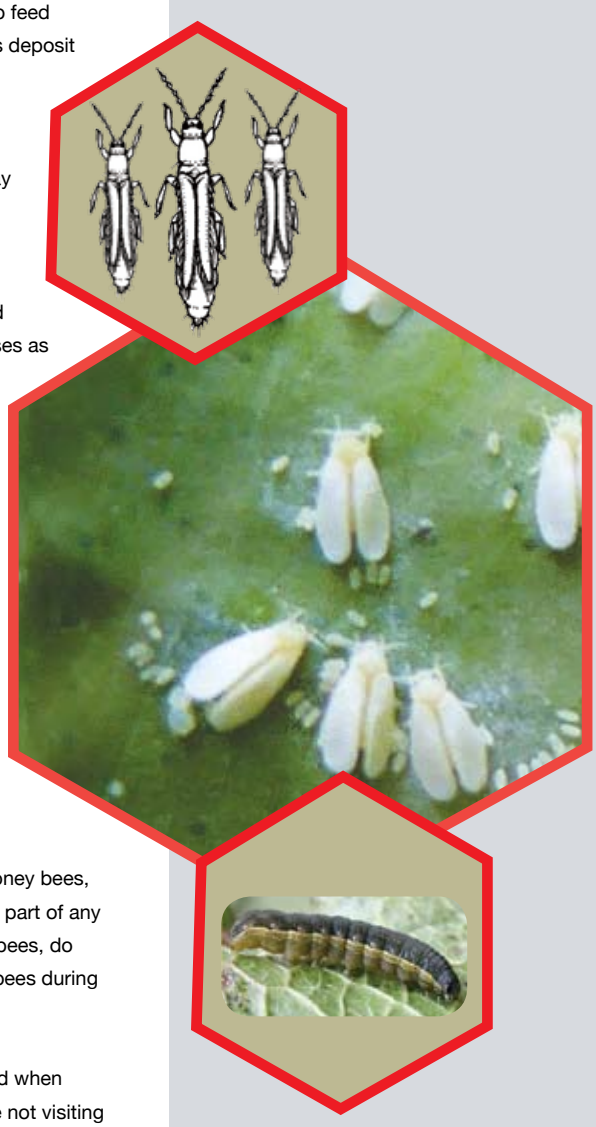
Mites are invisible to the naked eye but cause a great deal of damage. Mite feeding causes the leaves to curl, twist, and become brittle and scabby. Flower buds may dry up and die. Light infestations may result in discolored or dark-flecked flowers. Flower spikes are stunted and blackened. Mites are most active during high temperatures.

Whiteflies

The greenhouse whitefly and sweet potato whitefly can be important pests. Generally, these insects confines their activity to the warmth of the greenhouse. However when outdoor temperatures become favorable, they leave the greenhouse to infest suitable hosts outdoors.

Mining Insects

Leafminers. The larvae of this group feed within the leaves of plants. Females deposit eggs on the underside of leaves. On hatching, the maggots burrow between the upper and lower leaf surfaces and feed. Many leaves may have light green or white winding trails that eventually turn brown and die. The mature larva emerges through a slit in the leaf surface and enters a resting stage where it passes as a pupa in the soil. There are many species and lifecycles may vary a bit.



One method of controlling these pests is to pick off and destroy infested leaves and, in the fall to remove and destroy plant remains. Elimination of alternate weed hosts also helps reduce populations of leafminers in the field.

Protecting Pollinators from Insecticides

Protecting pollinators, especially honey bees, from pesticide poisoning should be part of any pesticide program. To avoid killing bees, do not apply pesticides hazardous to bees during the blooming period.

Ideally, pesticides should be applied when there is no wind and when bees are not visiting plants in the area. The time and intensity of bee visitation to a given crop depends on the abundance and attractiveness of the bloom. In general, evening or early night applications are the least harmful to bees.

Dust formulations and microencapsulated pesticides are usually more hazardous to bees than sprays. Wettable powders often have a longer residual effect than emulsifiable concentrates. Ultra-low volume (ULV) formulations of some pesticides are much more toxic than regular sprays.

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How Substrate Structure Influences Water Holding Capacity

A high-quality plant starts with a healthy and strong seedling or cutting. When choosing a substrate to sow seed or to root cuttings, growers often wonder which substrate to use. Choosing the right substrate not only depends on the physical properties of the substrate, but also on the type of plants to be grown, the growing environment and the availability of the substrate.

Substrate is comprised of a large number of particles. The particle size distribution defines the substrate's texture. Components such as peat moss, perlite, vermiculite, bark, coir, wood fiber, sand, etc. have particles of different shapes (granular, blocky, prismatic, platy or massive), and the size can be coarse, medium or fine. The size of the particles depends on the nature of each component. The structure of a substrate is determined by the way in which the particles are arranged in the substrate.

Terminology Used

- **Water Holding Capacity**

The volume of water retained by a saturated growing medium after it is allowed to drain.

- **Available Water Holding Capacity**

The portion of the water that makes up water holding capacity and that is available to plant roots.

- **Unavailable Water Holding Capacity**

The portion of the water that makes up water holding capacity and that is unavailable to plant roots.

- **Air Porosity**

The volume of air retained by a saturated growing medium after it is allowed to drain.

When blending a growing medium, the various particles pack together, leaving voids which can be classified as macropores or micropores. Macropores are large pores formed between large particles that readily release water, thereby decreasing water holding capacity, and serve as an air reservoir for root respiration.

Micropores are the small pores formed between small particles, and with the adhesive and cohesive forces of water, it remains in the micropores, contributing to the available water holding capacity and unavailable water holding capacity of the substrate (see terminology table for meaning of these terms). Micropores serve as a reservoir for water and nutrients when the plant needs them. A substrate with fine particle sizes generally retains more water than a substrate with coarse particles.

Young Plant Substrates

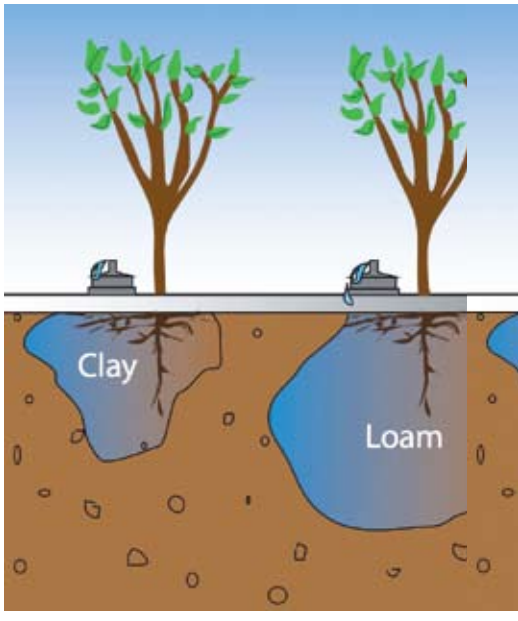
For seed germination or cutting production, it is important to use a substrate with fine particles that creates high water holding capacity not only because water is needed for seed germination or for root formation on cuttings, but they are often grown in cells with a small volume of substrate. Substrates with finer particles have lower air porosities, but within the category of germination and propagation substrates, water holding capacity and air porosity can vary.

Transplanting Substrates

Once the plugs or liners are of sufficient size, they are transplanted into larger containers. Some crops can be in these large containers for several months, much longer than in the plug or liner stage. So it is important that the substrate's structure and stability changes little during this crop cycle, which would affect the water holding capacity and air porosity.

Take long-term crop for example. This crop usually struggles with root disease towards the end of the crop cycle because the structure of some substrates has detrimentally changed. Regardless of the season, crop and type of plants, the structure and the stability of the substrate is compromised through loss of air porosity and increased unavailable water holding capacity.

This is due to frequent waterings (drops hitting the substrate's surface can cause compaction, saturation of the substrate (meaning it does not dry out rapidly), slow absorption of water by the roots and slow root growth (both due to decreased air porosity and increased unavailable and possibly available water holding capacity). Also, the natural biological or chemical degradation of substrate components creates fine particles.



In a substrate composed of small particle sizes, like humus, the water holding capacity will be high. However, the high water holding capacity of the substrate does not mean that more water will be available for the plant. The water held by these small particles is highly attached to them and the plant will need more energy to obtain it.

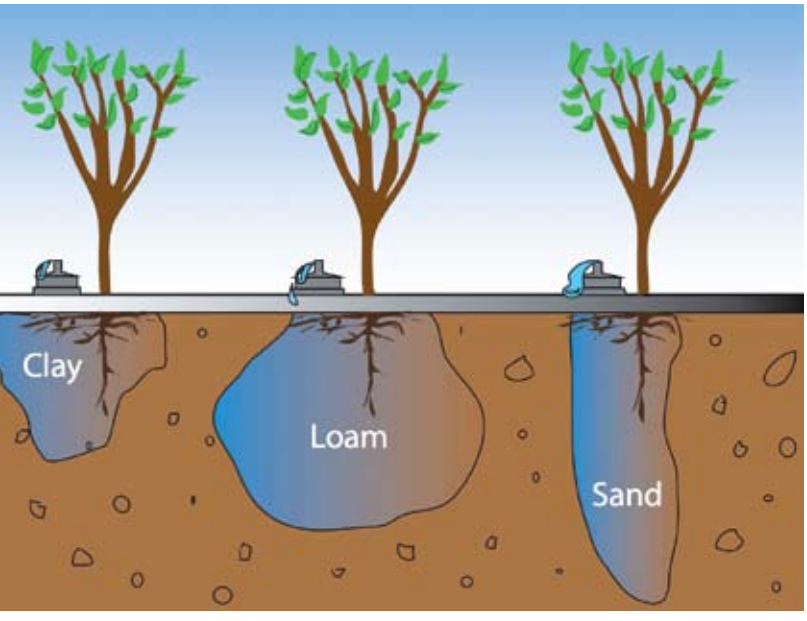
Importance of Substrate Structure

As mentioned, the structure of the substrate will change overtime: collapsing of the macropores from watering compaction, natural decomposition of the substrate particles, and mechanical damage of growing medium particles due to root growth. The last two create fine, broken particles which settle between and within macropores, reducing the number of macropores.

This results in a decrease of available water holding capacity, air porosity and drainage, whereas unavailable water holding capacity increases and the dry-out time between waterings is going to be slow. As a result, it is very important to choose a substrate that will maintain its structure and stability throughout the duration of the crop.

Substrate Texture's Influence on Water Holding Capacity

Finally, the structure and the texture of the substrate have a great influence on the water holding capacity. As mentioned before, the water content will depend on the type of pores in the substrate. A substrate with a single pore size will release all the water at certain negative pressure or suction. Therefore, it is recommended to use a substrate with different pore sizes to release the water at different negative pressures.



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In conclusion, a substrate with fine particles is not recommended for container production because fine substrates retain more water than a coarse substrate due to capillarity. In addition, air porosity and drainage will be limited. If a coarse substrate is used for small cells, the water content will be low, the drainage and the air porosity will be high, and therefore, frequent waterings will be required.

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Is the Future Biopesticide?

Biopesticides Market Growth, Trends, and Forecast (2
by Product, Formulation, Ingredient, Mode of Applicat

The Global Biopesticides Market was valued at USD 3147.1 million in 2018 and is expected to register a CAGR of 14.1% during the forecast period (2019-2024). Of all the regions, South America is expected to witness the fastest growth in the forecast period, recording a CAGR of 16.4%. In addition, the United States is likely to be the largest individual market over the forecast period.

While the prevalence of chemical or synthetic pesticides in crop protection continues; human, animal, and environmental health concerns are still playing key roles in driving the growth of biopesticides. Several countries are adopting a stringent approach concerning the amount of imports, with a special focus on regulating the quantity of pesticide residues. Emerging economies in Asia-Pacific are likely to take the lead in the adoption of biopesticides.

Biopesticides are certain types of pesticides, derived from natural materials as; animals, plants, bacteria, and certain minerals. It is important to take into consideration both microbial and organic pesticides. The market is broadly segmented into bioinsecticide, bioherbicide, biofungicide, and others. This presents a wide-ranging analysis of market share, size, and volume of the biopesticide market on a global scale.

Why Biopesticides

Currently, major challenges of humanity are population growth, food security, and concerns over pesticide residue in the food products. Aberrant usage of crop protection chemicals has resulted in the occurrence of pesticide residues in food products above the level (MRLs) set by the governing bodies. Hence, it is vital to identify and promote the environment-

2019 - 2024): Segmented tion and Geography.

friendly alternatives of synthetic chemical pesticides for sustainable growth in the agriculture to achieve global food security.

Biopesticide products/technologies are essential components in modern integrated pest management concept. They can also be used to complement the synthetic chemicals used in the protection of crops to achieve the maximum residue level (MRL).Increasing awareness about pesticide residues in food has led consumers to shift towards organic food products. Even the government bodies around the world are now putting policies in place with the intention to reduce the use of conventional synthetic origin crop protection chemicals.

Limited availability of quality products, low shelf-life of products, limited awareness about the benefits of biopesticides among crop producers, and weakness of the supporting policy network are some of the inhibiting factors for the growth of the biopesticides industry.

The growth of biopesticides is projected to outpace the demand for synthetic chemical pesticides in coming years considering the benefits they offer in protecting the crop from pest and diseases apart from other advantages such as residue level and resistance management, biodegradability, investments, and development of products (limited timeline and cost associated).

It is important to understand the qualitative and quantitative insights on the biopesticides industry analysis of biopesticides market size and growth rate for all possible segments in the market. The market is segmented by type, source, mode of application, and crop type. On the basis of type, the global market is categorized into bioinsecticides, biofungicides, bionematicides, and others. The global biopesticides industry is segmented into microbial and biochemicals.

Key Drivers

Easy Registration Procedures

Given that biopesticides tend to pose fewer risks than chemical pesticides, registration in many countries generally requires less data to register a biopesticide than to register a chemical pesticide. As a result, new biopesticides are often registered in less time, compared to an average of more than three years for chemical pesticides. To promote the use of biopesticide, developing countries have simplified the requirement for the registration of biopesticides. These countries are also providing grants for R&D and production unit setups. All these activities are creating an opportunity for the development of the biopesticide market, globally.

Increased Demand

Some countries have registered around 41.6% of the chemical market for biopesticides. Demand is driven by a number of factors, including the increased interest in green agricultural practices and the loss of many conventional products to reregistration and/or performance issues. Product development has also driven up the demand for biopesticides. Today more and better biological active ingredients and products are available which can complement conventional chemical pesticides.

According to the Research Institute of Organic Agriculture (one of the world's leading organic farming information and research centres), 50.9 million hectares of agricultural land is under organic farm practices (as of 2015) and witnessed a CAGR of 7.4% during the period, 2010 to 2015. The increasing area under organic farming is projected to demand more biopesticide products which will, in turn, boost the biopesticides market value.

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Competitive Landscape

In the global biopesticide market, companies are not only competing based on product quality and promotion but are also focused on strategic moves, to hold larger market shares. New product launches, partnerships, and acquisitions are the major strategies adopted by the leading companies in the global biopesticide market. Companies not only compete on new product launches but also focus on strategic moves, to acquire larger market shares. The results of the market share analysis indicate a highly fragmented market. The major acquisitions taking place between companies to develop biopesticides, indicates that the focus on bio-based products are increasing rapidly. The players in the market are investing heavily in this market, to diversify their biological research divisions in the expanding market place.

Other key factors driving the global market are the involvement of start-up companies in the R&D of biopesticide active ingredients. The limited time required for R&D of biopesticide products and the reduced investment costs compared to synthetic chemical active ingredients are the key factors that attract the start-up companies to involve in the development of biopesticide products

Market Segmentation

"Bionematicides to Emerge as the Most Attractive Product Type due to the Elevating Demand for Appropriate Solutions for Pathogenic Nematodes Control"

Biofungicides and bioinsecticides segments cumulatively accounted for nearly 92-95% of the global market in 2017. High-value fruits & vegetable crops accounted for the highest share in the consumption of biopesticide products globally. This factor will propel the biopesticides market growth moving forward. Current share of global market is limited but is projected to witness strong growth during the forecast period. Around 10% of all the nematodes species are plant-parasites and the crop losses valued nearly USD 80-100 billion annually. Horticultural crops grown under protected cultivation are more prone to damage by pathogenic nematodes. Increasing shifts in patterns of tillage of soil and adoption of zero or minimum tillage farm practices are leading to the enlargement of pathogenic nematodes population density in the soil.

This factor is predicted to contribute to the biopesticides market growth. Considering the economic losses, industry stakeholders (including a large number of start-up companies) are actively exploring the opportunities to identify the biological pesticides that are effective in controlling the pathogenic nematodes, and the same is projected support for the strong growth of the bionematicides market. Bacillus firmus, Pasteuria spp, and Purpureocillium lilacinus are currently identified as potential nematicides.

Microbial segment is projected to witness strong growth

Microbial such as bacteria and fungi account boasts of the highest share in the biopesticides market and are projected to witness strong growth in the biopesticides Industry during the forecast period. Microbial-based biopesticides are popularly used to protect the crops from a wide range of plant pathogens in various cultivated environments such as fields, nurseries, and protected cultivation systems (such as greenhouse and glasshouses).

Proven efficiency in the control of various types of pests in a wide range of crop types (especially horticulture crops) is contributing to the growth of microbial biopesticides. In April 2018, Isagro USA received approval by the California EPA for Taegro-2 broad-spectrum biofungicide (with active ingredient Bacillus subtilis var. amyloliquefaciens Strain), which is recommended for use in a wide variety of horticulture crops and the product provides protection of major soil-borne and foliar diseases.

North America and Europe are the two largest biopesticides users at present and they are expected to account for a significant proportion of the biopesticides market during the forecast period as well.

Stringent regulations on the usage of synthetic crop protection chemicals to protect the environment from hazardous effects are driving biopesticides Industry in North America and Europe. South America and Asia Pacific are emerging markets in biopesticides and are projected to witness strong growth during the forecast period to hold a significant market share in global market.

Key Market Drivers

"New products launches and acquisitions are the key strategies adopted in the market"

New products launches and acquisitions were the preferred strategies during the period from 2014 to 2017 gained access to the global market. Moving ahead, new product launches and agreements strategies are projected to uplift biopesticides market value during the forecast period. For instance, Stockton STK specializes in the development of botanical-based pesticides, have signed several long-term distribution agreements for its innovative product Timorex Gold biofungicide with key companies in the agrochemicals industry.

Trusted by growers worldwide to take crop protection to the next level

Adding Silwet* adjuvants by Momentive to your crop treatment can significantly enhance the effectiveness of your agrochemicals.

Maximum coverage through superior spreading and adhesion

Improved spray efficiency with lower spray volumes

Controlled absorption providing improved performance and rainfastness

Helping on the farm for more than 35 years in over 45 countries.

ASK FOR THEM AT YOUR LOCAL RETAILER

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Distributed by: ELGON KENYA

Agent: Arysta LifeScience

Spirit of Success:

Hannah Kibiru

Technical product development specialist

Not only earning a living but also technically giving back to the society.

Concisely describe Hannah Kibiru

Kibiru is a Dedicated, self-motivated, enthusiastic and strategic thinking professional with 10 years' experience in the Agriculture sector as an Agronomist. Well versed in all phases of horticultural crop production, specifically in floriculture and Olericulture, People management, production and sustainable use of conventional crop protection agents in harmony with the Bio- control agents. Experienced in managing projects from requirements gathering/ needs identification phase all through to completion.

What spurred you into Agriculture? Any role model who inspired you?

As a young lady growing up in a third world country, I saw people daily suffering and struggling to meet the basic nutritional requirements. I felt I would make significant impact on many individuals by taking agriculture as a career and profession. By participating in this sector am sure of not only earning a living but also technically giving back to the society.

I consider my parents as my role model though they practiced small scale farming am proud and appreciate what they were doing and how much they achieved with the limited Agricultural knowledge.

Kindly take us through your journey in Agriculture to your current position.

Kibiru is a qualified Agronomist with 10 years' experience in the Agriculture sector in Kenya currently working as Technical Product Development specialist at UPL Limited. Have previously worked as a Senior Technical lead and as an IPM consultant for Biological controls and Implementation of Integrated Crop Management programmes in Kenya.

How would you describe your time as the Technical Product Development Specialist at UPL Limited? Are you passionate about what you do?

The period that I have been practicing as the

1

> "I set personal objectives based on the key performance indicators in line with my role. My responsibility entails that I conduct trials, provide quantitative as well as qualitative proofs that the product is what it's claimed to be."

product development Specialist at UPL has been quite enriching and fulfilling in many ways. It has been a period that involves a lot of networking, intensifying my professional knowledge and skills while working with people of different calibres and at the same time ensuring that the core objectives are not missed.

It involves a lot of movements and coordinating various aspects of product development with different stake holders thus I have become more resilient, patient and achieving results while working under tight schedules.

Learning is a continuous process therefore the daily challenges in the industry/position are horning and equipping me with better knowledge and new skill sets for a better tomorrow in my career.

Am very passionate about my new role since working with new products always presents something new to learn every day, I therefore consider this enriching as I find solutions that fits the farmers unique needs.

In a nutshell describe UPL products portfolio for the flowers sector and how you have ensured they are not only quality but also well used?

UPL provides a range of products that cuts across all farm crop protection needs thus the farmer is presented with an opportunity to choose from the variety. Introduction of new molecules in the product range also provides an avenue for integration of new approaches in crop protection, an example is just the newly launched Vacciplant (Laminarin) which offers a completely different mode of disease control.

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2

1 and 2: Hannah doing vacciplant presentation after succesful field trials

Tete-a-Tete: Hannah Kibiru in deep discussions before the company event.

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As a product development specialist my key role is to ensure the grower is well equipped with the knowledge of how the product works in synergy with other products that are available in the market. The grower has to understand the mode of action, Rates, application methods, rotational interactions, risks involved if misused in line with FRAC/ IRAC guide lines and optimum performance/ efficacy requirements so that the product is not abused and rendered useless.

For the last few months we have seen a more aggressive UPL presence in the flower sector, especially working with the growers, what can you attribute this to?

The presence of specialists in the field and working closely with the farmers creates that feel of “am there for you” attitude thus the growers are more readily willing to work UPL Ltd.

As the Product development Specialist, communication and sharing of new solutions with the growers has been a key in the willingness to follow up and give feedback in a two pronged approach. Knowledge is power and when you share with people they tend feel valued and appreciated in their respective roles.

What can you promise the flower sector in the next few months?

I can promise the growers a more concerted and integrated work approach that foster sharing of information and coming up with customised solutions to their specific challenges.

Incorporation of new molecules will certainly complement the approach as we manage pests and diseases sustainably.

What’s the biggest challenge YOU feel faces the flower sector crop protection departments, and what you are doing to help them

The main challenge in the flowers sector partly lies with the certifications which has continuously phased out molecules thus narrowing the range of available options. On the other hand this presents an opportunity for our company (UPL) to come up with what is considered as green and works in harmony with the environment therefore I consider this challenge positively as a viable business avenue that can be exploited by the company and I would say we are already focused in that direction.

The Global warming is real- More CO2 increases pests and diseases thus warmer temperatures lowers the effectiveness of some pesticides but on the other hand, it favours insect carriers of many disease pathogens and Natural enemies of pests and diseases

Describe how you manage expectations, as well as go about goal-setting for your staff.

As a Technical product development specialist, I set personal objectives based on the key performance indicators in line with my role. My responsibility entails that I conduct trials, provide quantitative as well as qualitative proofs that the product is what it’s claimed to be. It therefore calls for constructive and

structural approach in realizing this therefore I have to work within specific time frames as well as cover all the necessary parameters involved qualifying a product as effective and suitable for the intended purpose.

This is displayed on the level of understanding of the growers regarding the product and subsequent acceptance and consumption by the targeted group.

As a woman in a position of leadership, have you felt that at times, the scrutiny was much more intense just by virtue of being a woman? How do you respond to this?

In General, there have been explored unique barriers that prevent more women into leadership such as Glass cliffs, not being offered equal opportunities, lack of confidence and cultural barriers. Fortunately, I have never felt less since I believe in my capacity to compete fairly and deliver expected results. Confidence, building alliances with my seniors/ peers, pick one's brains, building sisterhood and being myself are some of the traits that have so far played well in building my career.

What are some of your choice teamwork-enhancing strategies?

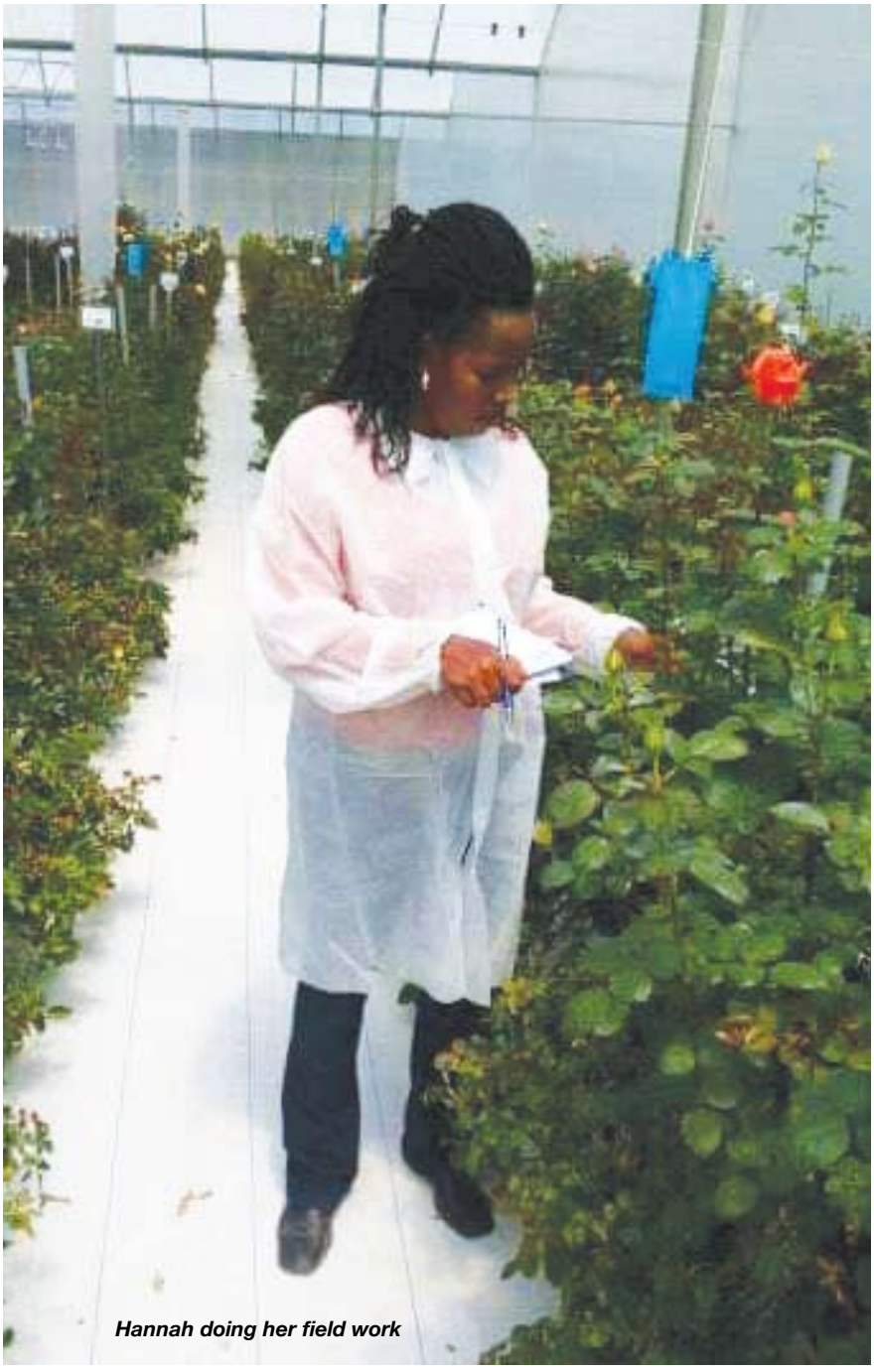
Adoption of open door policy and enhanced clear communication, trust, embracing diversity of capabilities, flexibly adapting to changing condition and finally having confidence in myself and the team.

What is your preferred style of working or management? Does it in any way empower or affect the daily output of your team?

I find self-initiated and inclusive leadership more practical since the team is given opportunity to share their views thus acting from a well-informed perspective. This do not make one a weaker leader as long as the results are not compromised or achieved unethically.

A few words of advice to young girls

Girl Child has the capacity to achieve their dreams just like their male counterparts therefore whatever you dream it loud and do what it takes to reach the helm.



Hannah doing her field work

What legacy would you like to leave behind?

As a woman in my position, I intend to reach the apex of my career and leave holistic, indelible and sustainable mark in the agriculture sector by impacting on people's lives as I give back to the society through my experience as an agronomist.

Give your final comments

Due to anticipated increase in world's population from 7.7 Billion to 9.7 Billion by 2050 whereby urbanisation will continue at an accelerating pace with about 70%, it gives hope to the farmers and Agriculture remains the core employer in the whole world. Increase in population requires increase in food production.

Corteva Agriscience Engages Growers with Solutions

Corteva Team after the Naivasha Event

Corteva Agriscience contributes to quality flower production in Kenya and beyond through the development of quality crop protection products and integrated pest management strategies. This is through understanding of the biology, ecology and physiology of the pests and diseases in relation to flower production.

Recently the Regional Corteva team led by Mr. Francis Karanja, Sales Manager ESCA and Doris Kawira Business Development Manager ESCA made an elaborate tour in the flower growing areas of Naivasha, Nakuru, Nanyuki among others and discussed their knowledge and solutions to the pest and diseases challenging the growers.

The team had an easy to follow, reference for assessing plant health problems. It provided clear instructions, with many illustrations on identification, diagnosis as well as management of the pests and diseases. The presentation aimed at growers and others with an interest in crop production and crop protection was made in response to a number of rejections due to quarantine pests among other challenges.

The team proved their knowledge on crop protection as they took growers through Thrips, FCM Mealybugs and Downey Mildew solutions.

Thrips.

Thrips are very difficult to control conventionally but IPM strategy is more useful. This is because part of their lifecycle is in the ground. This is an important common factor in the development of an IPM program. With over 8000 species of thrips worldwide; most devastating are *Thrips tabaci* (onion thrips) and *Frankliniella occidentalis* (Western Flower Thrips)

Understand Western Flower Thrips Biology

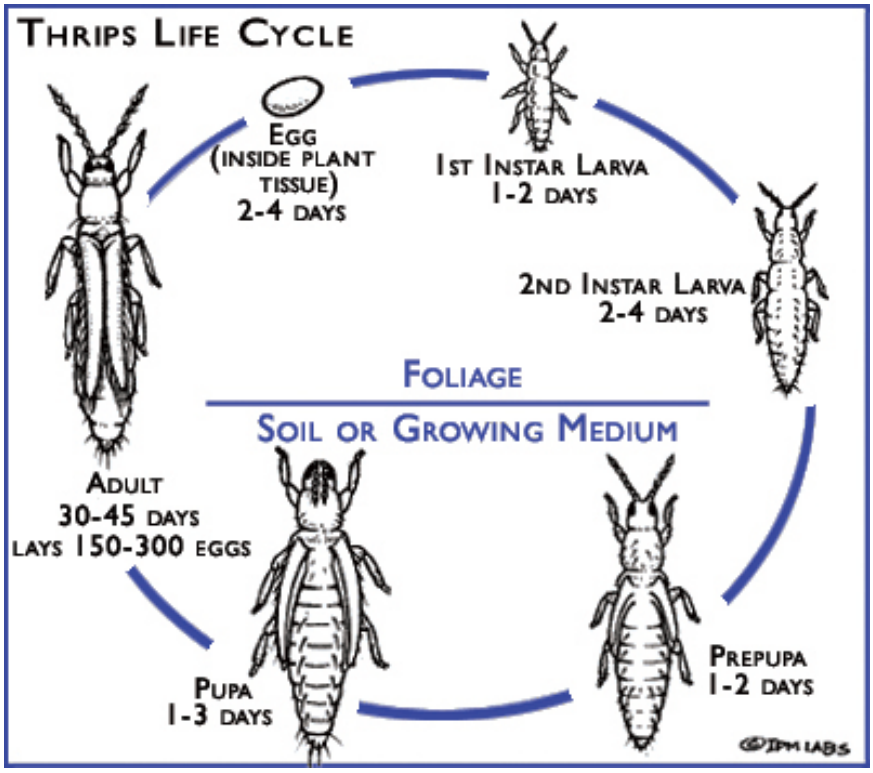
Adults are less than 2mm. Their males are

Right: Doris discusses with farmers

pale yellow and females have a yellow to orange-brown head and thorax with a brown abdomen.

Thrips lay eggs inside the plant tissue till they hatch and emerge 2-4 days later. The 1st stage instar is clear, 2nd stage is yellow at first. Both the 1st and 2nd larval stage hide among the bud and flower parts. 2nd larval stage turns white just before it molts and moves to the soil or leaf litter, pupates and undergoes metamorphosis to an adult. Adults emerge from the soil 2-5 days later and maybe yellow or dark brown. They hold their four hair-fringed wings flat over their backs and can live 30 to 45 days.

Greenhouse Lifecycle: In the greenhouse, the life cycle is continuous and all stages can be found all year round. Female thrips tends to inhabit flowers and the younger leaves of plants. Eggs are laid singly in flowers, young leaves and the softer parts of stems. A small portion of the egg remains visible at the surface. After hatching, larvae move to protected areas on the plant and commence feeding. Most pre-pupae drop to the ground where they complete the pupal stage. A few thrips pupate on the plant in sheltered places. Females lay about three eggs per day and can lay up to 300 eggs.



Thrips Management

Thrips management involves early detection and identification followed by a vigorous control program.

Be hygienic around the greenhouse: Do not plant flowers around the greenhouse. Ideally have 10 metres of bare ground such as asphalt around the greenhouses or have closely-mown grass. Control all weeds on the property, especially black nightshade

Propagate plants hygienically: New plants must be propagated so that they remain free of thrips. If you buy, plants, specify the conditions under which they should be grown. The greatest risk is from cuttings. The source of cuttings must be free of thrips.

Using blue traps to monitor thrips: Traps-hung near openings or just above the tops of the crop plants. Western flower thrips is most active in the region of flowers and young growths

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Group Photo: *Growers in Nakuru after the seminar*

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Pick all blooms: Do not leave unwanted flowers to bloom in the greenhouse. Huge numbers of western flower thrips can breed in one flower. Pick all flowers, even the unwanted ones. Remove rubbish bins full of discarded blooms in the greenhouse.

Western flower thrips life cycle and effective use of pesticides

Western flower thrips has two life cycle stages that are protected from short-lived pesticides. These protected stages are the egg, which is embedded in the plant, and the pupal stage, which is hidden in the plant in the soil, under planter bags or where plastic sheets overlap. Spray applications must be timed to get the vulnerable larvae and adults when they emerge from the eggs or pupae and before they have become pupae or laid more eggs. The egg and pupal stages take between three and 12 days depending on temperature. Pesticides must be applied in groups of three sprays at three to five day intervals; three days apart at higher temperatures and five days at lower temperatures.

Corteva Solutions

Corteva prides themselves with both Radiant™ 120 SC *Spinetoram: 120 ga.i/L* and Delegate™ 250WDG which contains *Spinetoram: 250gai/Kg*. Delegate which is the more preferred in flowers is known for its quick knock down activity. It has a unique mode of action and is effective ay low rates. The product has a short pre-harvest interval of 3 days and is a valuable partner in crop rotation with other chemistries. It also has minimal impacts on all beneficial insects and predatory mites. It is also *active on all economically important caterpillar (lepidoptera) pests and thrips.*

False Codling Moth (FCM)

Scientifically referred to *Thaumatotibia leucotreta***,** (False Codling Moth, Orange Moth, Citrus Codling Moth or orange codling moth). It is the Lepidoptera, Larvae stage of the moth is the most devastating stage of FCM. They feed on a wide range of crops (Fruits, Maize, Cotton and Recently we have seen attacks on Roses)

Biology and Life Cycle

Adult FCM is a nocturnal moth that operates at night. They have patterned 1.25 to 2 cm wings with a variation of colors: grey, brown, black, and orange brown. FCM life cycle ranges from 30-174 days, it can produce 2 to 10 generations each year depending on the environmental conditions and availability of host crop. After Adults mate, the eggs are deposited on the fruit surface, a single moth can produce up to 800 eggs under ideal weather conditions. The eggs hatch into Larvae within 2 to 22days.The Larvae burrow into the host fruit and begin to feed on the pulp of the fruits. This stage lasts for 12 to 67 days depending on the weather condition (Cold weather slows the process unlike hot weather). At maturity the Larvae exits from the fruit and drops on the ground to form a pupa which is harboured in the soil. The pupa undergoes metamorphosis to winged adults. The length of this stage is both temperature and gender regulated. (Warmer periods are conducive to a quick emergence, while cooler temperatures render the process to a slower rate. Male moths require between 13 and 47 days to reach maturity and females need between 11 and 39 days).

Corteva Solutions.

Corteva is among the few companies which have managed to develop a FCM control product. Delegate™ 250WDG which contains *Spinetoram: 250gai/Kg* is the more preferred for the management of FCM in ornamentals or flowers.

Mealybugs

Mealybugs is known to have two main species; Citrus mealybug, *Planococcus citri* and Longtailed mealybug, *Pseudococcus longispinus*

Biology.

Cottony mass helps protect the eggs laid within the wax filaments. The eggs hatch in 6-14 days. The 1st instars, “crawlers”; disperse for only a short distance on the same leaf. Citrus mealybug female can produce about 600eggs. The eggs maybe produced with or without males. Generations overlap hence all stages are present.

Feeding: Mealybugs have sucking mouthparts. Once they insert their mouthparts, they remain anchored for the duration of their development but can move to a new site if disturbed. Feeding weakens and stunts plants, causes leaf distortion, yellowing, and even total leaf loss. They produce large amounts of honeydew and can feed on a wide range of host plants.

Management.

Early detection before it becomes too difficult & costly to deal with is key.
With most non-systemic insecticides, if infestation is well established, it is advisable to make a series of applications (10-14 day intervals). Growers are advised to observe resistance management.

Corteva Solution

Corteva has developed a novel product for Mealybugs. Closer 240SC is a systemic insecticide for sap sucking insects containing Isoclast (Sulfoximines sub group 4c) translocated acropetally in plants.
In addition it also controls Aphids and whiteflies.

Disease Management

Every grower at one time must face Downey mildew. In the flower sector, it is not easy to discuss downy mildew without discussing Equation™ Pro

A combination of two unique active ingredients famoxadone (22.5%) and cymoxanil (30%), It offers a broad spectrum control.

Famoxadone (22.5%) offers a Preventive, broad spectrum disease control among them downy mildews, late blight & early blight. It has epicuticular fixation, extreme rain fastness, redistribution. It is known to stop cell respiration & growth. The A.i Inhibits spore germination and mycelium growth. It is an antisporulant.

Famoxadone is classified as FRAC Code 11 fungicide – Respiration (oxazolidine-diones chemical group)

Cymoxanil (30%) offers Preventive and curative control of late blight. It penetrates plant tissue, translaminar and local systemic movement. It has a Multi-site MOA fungicide affecting respiration & membrane permeability. Cymoxanil stops lesion growth and sporulation and induced host response. Cymoxanil is classified under FRAC Code 27 fungicide – Unknown MoA (cyanoacetamide-oxime chemical group).

Conclusion.

Growers who attended the seminars were taken through these solutions and much more. The team promised growers to be in touch to introduce more solutions.

Mr. Nicolas Crete, Biosolutions Specialist and Commercial Manager Middle East Speaking to Growers During the Launch of Vacciplant

All Joy As UPL Ltd Launches Vacciplant

Every month, I visit tens of flower farm, the flourishing, the ticking over and the ones in dire straits. A lot of my hard work is asking questions as we walk round the farm. One of the common questions is which is the commonest disease and pest round the year. This is an area all growers agree, powdery mildew is all year round disease. So, when I was invited for a Powdery Mildew launch by UPL ltd, it was all joy.

UPL Ltd has continued to deliver successful new product launches, this time Vacciplant, a new innovative fungicide against powdery mildew in ornamental crops and snowpeas. Two Successful launch activities were held in Nakuru and Naivasha. Expectations filled the air as I mingled with growers who attended the launches in both towns. Timely and almost audio-recorded voice of Mr. Nicolas Crete, a UPL Biosolutions Specialist from France, greeted the air as he announced a new tool of action against Powdery Mildew.

Mr. Innocent Arunda, Marketing and Sales Manager, Floriculture and Horticulture -Kenya speaking to growers during the launch

Speaking to the growers Mr. Nicolas asked, “Have you ever thought of protection without residue?” Adding, “Today, am presenting to you one of the newest technologies in protection against powdery mildew and other casual pathogens. It makes protection without residues possible at farmer level and it is a great tool for successful Integrated Pest Management programs. The best alternative for the most demanding food chains and organic growers, is a complimentary solution to conventional plant protection products”.

As an eye opener to the new molecule, Mr. Nicolas said, “all living organisms, plants have evolved a wide range of mechanisms to defend themselves against diseases and pests. This defence mechanisms is induced by environmental factors and not necessary specific to the inducing pathogens. These immune mechanisms are shared by all the plants and are nowadays a well-established fact. This is the concept we are presenting to farmers today”.

Vacciplant

Vacciplant 4.24% SL is a bio-fungicide containing Laminarin as the active ingredient which controls Powdery Mildew on Roses and Snow peas. Laminarin is a natural ingredient extracted from Laminaria digitata a seaweed very concentrated in this molecule.

Mode of Action

Vacciplant active ingredient, laminarin is a molecule with a similar structure to degradation products of pathogenic fungi walls, oligo-glucans which are the elicitors of defences activation during an attack. It is recognized by the plant as a signal of attack that triggers the defence mechanism of the plant. Thus, Vacciplant is able to trigger the natural defence mechanisms to put the plant in a defensive state before the real attack occurs. This reaction lasts for between 7 to 10 days (depending on crop and disease)

Natural Plant Defence Mechanism

Plant response implies the recognition of the attack (infected spot). The alert message is disseminated in the whole plant. Defences are then activated in the whole plant and newly formed organs are

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> ”
> Vacciplant is able to trigger the natural defence mechanisms to put the plant in a defensive state before the real attack occurs. This reaction lasts for between 7 to 10 days (depending on crop and disease)

Mr. Pinakin Gurjar-Country Manager, Kenya Speaking to the growers during the launch

UPL Ltd team is joined by their distributors ob stage to officially launch the product

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protected. The plant then reinforces the cell walls, Produce Phytoalexins and PR Proteins as the three main pathways of defence.

Benefits

- Limits infection: Vacciplant triggers defence mechanism preparing the plant for an attack before it happens.

- Vacciplant activates defences in the whole plant: Systemic effect of the plant defences allows the protection of newly formed plant parts.

- Vacciplant is a tool used as a pathogen resistance management: minimizes resistance build up as well as fungicide residues management in roses and in peas.

- Frequent use of vacciplant reduces the number of fungicide (chemical) spray against powdery mildew.

- Vacciplant active ingredient is naturally occurring thus an important IPM tool; safe to beneficial organisms and the environment.

Field Trials

Ms. Hannah Kibiru, Product Development

Specialist, UPL Ltd, shared results from trials conducted in Kenya on over 60 rose varieties and other ornamental varieties in collaboration with more than 50 growers across the different flower growing regions. Vacciplant proved to be effective against powdery mildew on Ornamental Plants especially when applied as preventatively for three consecutive applications at 7-10 days interval. Vacciplant is safe to a wide range of beneficial insects and predatory mites. Ms. Kibiru reiterated Vacciplant should be applied as a preventive spray as part of good disease management practices.

Photos 1,2,3,4 and 5 shows growers keenly following the presentations.

Powdery Mildew

Giving an elaborate presentation during the launch in both Nakuru and Naivasha, Mr. Titus Ngatia Product Development and Regulatory Lead, East Africa & Middle East, explained the economic importance of powdery mildew in ornamental crops including the disease symptoms, etiology, epidemiology and management. “One of the most important constraints in rose production is powdery mildew. He said, “Powdery mildew has a worldwide distribution and the economic impact is due to reduced flower production and the aesthetic value that is seen in fewer flowers of poorer quality. Therefore, for effective disease management, knowledge of the biology and epidemiology of the pathogen as well as the host characteristics and those of the pathosystem are very critical to understand”.

Powdery mildew of Roses is caused by Podosphaera pannosa previously Sphaerotheca pannosa. Disease symptoms include;

- Infected areas gets covered with a greyish white powdery fungal growth

- On older leaves- large white patches appear that eventually may become necrotic

- White patches also appear on young green shoots and may coalesce covering entire growing shoots

- Sometimes buds get attacked and become covered with white mildew.

Growers Comments

During the Vacciplant launch in Nakuru, Mr. Lucas Choi, a well renowned grower from the area, took the opportunity to congratulate UPL on this important milestone of providing an innovative solution against powdery mildew in ornamentals that will significantly improve both quality and quantity of production. Ms Christine Karambu, who graced the occasion in Naivasha, also expressed similar sentiments. Ms Karambu thanked UPL for closely collaborating with various stakeholders in the flower industry to bring to market solutions that meet the needs of growers and the European export markets.

“Despite the Challenges, This is a Good Time to be Selling Flowers”

The state of the flower industry is the topic now everywhere. Some of the people discussing have had a major impact on the flower industry and other have zero.

“When you think about the Declaration of Independence, you often think of John Hancock and his signature. And when you think of the flower industry, you think of Netherlands This is the time to think outside the box and discuss the basics of marketing and advocacy for the flower industry and the strategic planning globally.

State of the floral industry

In a survey conducted comparing 2016 to 2018, the total wholesale value of flowers in the US was up 9% to $4.6 billion, and the number of producers had also increased by 8%.

A major factor in the way the floral industry has evolved has to do with, like other industries, what is true today that was not true 10 years ago, he said. Ten years ago, Instagram was not around. Amazon was, but its influences changed from a novel idea to normalcy. Flower subscription services now exist. Millennials make up 70 million of the population whereas boomers make up 40 million, he explained. The millennial influence has a big effect on what and how things are sold.

Studio and event florists became the fastest-growing segment of the market, and online buying became the fastest-growing category for retailers.

“Through the years, the number of retail florists has dropped, but the numbers are now stabilizing,” he said. “The loss in retailers is fewer, and the trend of the decrease is looking better.”

The total spending on flowers is looking good and has a projected growth of a 4% increase by 2023.

“We want to be exactly what growth-minded professionals need when they need it,” he said.

The change needed to ensure relevancy relevance must be initiated. It must challenge tradition and the status quo by thinking boldly and being open to new ideas; to use data to understand current and future needs; to be open to having tough conversations regarding disruptors in the industry; and to think beyond individual biases and motives.

Market must get rigorous understanding of the challenges and opportunities facing the industry.”

Challenges

The industry faces challenges with labor, from trucking industry shortages to an aging workforce. Many businesses/entrepreneurs are struggling to find help. Developing a career path for ambitious new hires is a high-priority point for development moving forward. Competition remains a constant threat to businesses as rising costs for health care, costs of goods and freight and understanding new technologies represent other challenges.

Opportunities

But, there are also opportunities to be had. Brick and mortar stores are alive and well. Some say Amazon killed brick and mortar, but Amazon is actually adding storefronts. They are trying to make it better."

The experience economy is key. Nostalgia being the key product, businesses have to orchestrate events that embrace memory. Businesses must consider what they can do offline that cannot be done online to create experiences that are so important to floral industries.

The plant craze has also benefited the industry. With millennials, plants are like the new pets. Thirty-seven percent of millennials grow plants and herbs indoors and fulfill their desire to feel closer to nature.

Localvores are also influencing the industry. Those with a desire to keep it local and embrace the farm-to-table movement are also big drivers in the floral industry. This group truly appreciates a story behind the product.

Moving forward

Gurus must continue creating training resources to help orchestrate a pipeline for talented individuals to succeed in the industry. An online training portal with certifications and shared experiences will assist in an upward career progression for the industry, businesses and employee retention.

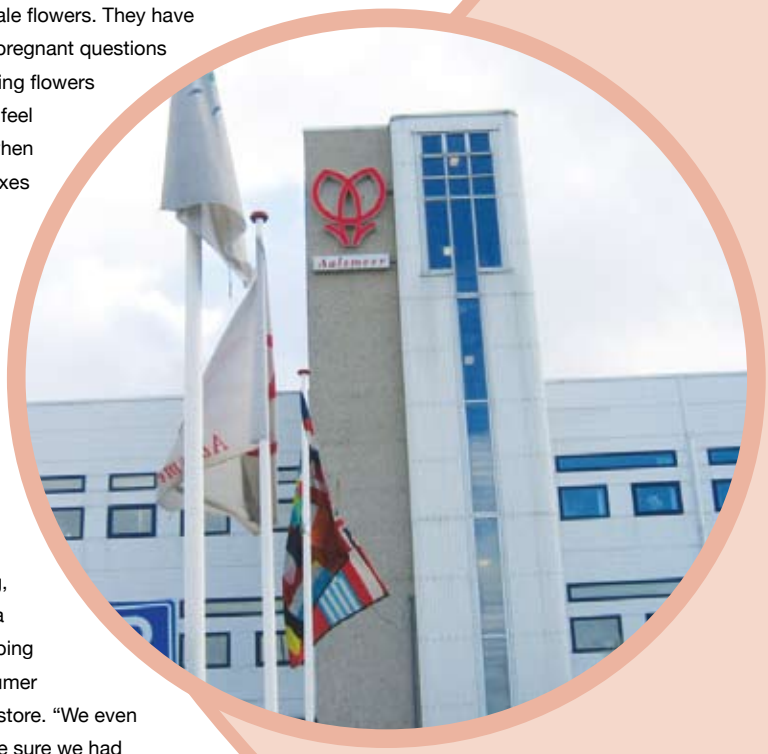
Embracing digital delivery will be critical. And educational, regional gathering/ webinars will provide an opportunity for peer-to-peer learning. Companies should be looking into local marketing resources, intel about competitive forces, technology options, consumer preferences and new business opportunities.

Despite the challenges, this is a good time to be selling flowers. Consumer preferences are evolving, and competition is stiff, but it is there.

A shift in consumer buying patterns

Breeders

"Our best ideas often stem from customer questions." That's what breeders of flowers will always tell you. In the farm we find that entrepreneurs need consulting for how to put grow and sale flowers. They have questions, pregnant questions about growing flowers so they will feel confident when they see mixes to choose from.



'This will change retail'

According to a retailer, the reception has been outstanding, and it was a big job keeping up to consumer demand in store. "We even had to make sure we had someone staffed everyday with the sole task of building the mixes for consumers. Customers service staff were so successful that we anticipate a shift in the consumer buying patterns. This will change retail. Fall is just barely here and I already have customers requesting.

Taxation: Time to Think Outside the Box

Ask any coach and He will tell you that when his fate depends on competitors' match, the situation is out of control. So, it is with Kenya's flower sector as our fate in the flower sector is determined by others. The truth is, we are in a catch 22 situation. This is the time for Kenya to think outside the Box and redeem its flower and export sector.

Flower farms push for special zones

Flower producers want the enterprises granted Special Economic Zones (SEZ) status to cushion them against runaway costs that are fast eroding competitiveness in the export markets. Kenya Flower Council chief executive Clement Tulezi said while the SEZ Act was assented to in September, 2015, and came into effect on December 15, 2015, regulations to operationalise it were yet to be gazetted.

"We deal in export-bound only products that warrants us to enjoy SEZ status. New regulations will create licensing processes and state fees applicable while enabling flower enterprises to enjoy tax benefits that come with this authorised economic operator special status," he said. Mr Tulezi said SEZ the status will help ease challenges attributed to new punitive regulations on control of plastics and double inspection of imported fertilisers.

Flower companies are losing the market to Ethiopia.

"Flower companies pay up to 45 levies and taxes per year where the costs borne are passed onto flower buyers making our flowers uncompetitive on the global flower market. Kenya must abolish these taxes and levies or continue losing out investments to its neighbouring countries that offer tax incentives, VAT exemption of equipment and inputs, deduction on cost of energy, availability of water and accessibility to land," he said.

KFC also called on the government to allocate development funds to the multi-billion shilling industry saying this could help smallholder farmers venture into flower farming thereby creating new jobs and businesses.

Taxation Slowly Eroding Flower Growers Competitiveness

For the longest time ever, VAT refunds from Kenya Revenue Authority (KRA) have been a thorn in the fresh to the Kenyan exporters.

Over the last one decade, there have been relentless cries from exporters about the amount of money held by the government in form of VAT refunds. But nowhere else is the cry louder than the Kenya flower industry with over one billion shillings being outstanding at anyone given time.

To spur growth of the exporting sectors, the government zero rated exports of products and services as an incentive. But in a country that saw its economy almost ruined by the infamous goldenberg scandal, the government instituted stringent measures to verify exports that take place. Before the launch of i-tax platform by KRA, the process was manual, lengthy and costly as exporters had to employ at least 1 clerk to follow up the paper trail. Further, delay in making entries by the customs meant lengthy wait by exporters for all the documents to be in order.

A critical success factor of any business is a healthy cash flow and with the vital VAT refunds slowing down, exporters face cash flow challenges and increased cost of doing business as a result of short term borrowing to address this. This coupled with other challenges such as the ongoing fertilizer shortage means falling competitiveness of Kenya's flowers and stifled growth and expansion of the industry.

All is not doom as our source at KRA's domestic tax department indicates that there is a proposal to have tax credits such the VAT refunds, applied to tax liabilities across all tax heads. This means, for instance, once a refund claim has been approved, it can be used to offset other tax liabilities, e.g. corporate tax. The proposal is expected to be incorporated in the next budget cycle.

The Role of Tax incentives in Cushioning the EPA Impact

Faced with the pressures of loss of foreign direct investment, loss of employment, capital movement and the threat that companies will relocate unless provided with concessions to cushion the EU tax regime such as more lax regulations and lower taxes, government must respond by promoting tax incentives to attract and retain investment capital

Having limited economic options Kenya should move to tax competition as a central part of their sector development strategy to attract and retain the companies in the country.

Why?

A number of growers say the business is no longer a profitable undertaking under the current business cost regime. It now requires urgent measures to cushion producers against unhealthy competition from countries with less costly systems.

Under the prevailing circumstances, it is important the private sector and government

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agree on a platform that is supportive of a sector that gives Kenya national pride.

It is said that Kenya is where Netherlands was 20 years ago, and if we are not careful, we could be where Netherlands is now (no longer a major producer) in 20 years and Ethiopia will be where Kenya is today – a major producer.

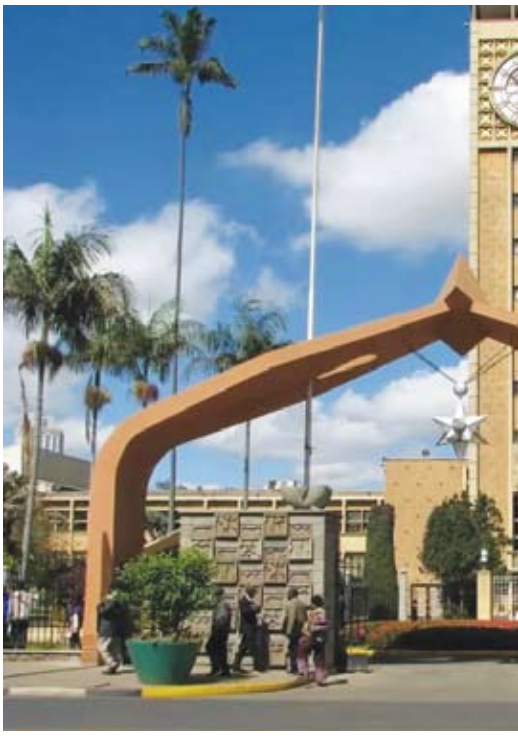
But we still have every reason to celebrate the industry. The flower industry has come of age, in a 30-year journey that has seen it now take pole position in major markets globally.

However, the sector suffers from policies that have indirect effect on agricultural incentives such as:
(i) Import tariffs
(ii) Price
(iii) Macroeconomic (especially exchange rate) policies that affect the economy-wide balance between traded and non-traded goods in addition to turning the terms of trade against the flower sector and in favour of industry. These incentive-distorting policies received minimal attention

Tax Regime Today

Multiple taxation by the governments is negatively affecting the sector and is likely to pose an existential threat in the coming years if not reviewed. Flower farmers are paying taxes to the national and county governments as well as to other government agencies. This harsh tax regime and lack of incentives in the country has slowly eroded the competitiveness of the sector.

Flower farms pay agricultural produce cess and have to get single business permits from the counties. All flower farms are required



to remit taxes to the Ministry of Irrigation, the Water Resource Management Authority (Warma) and the National Environment Management Authority (Nema).

WHAT NEXT

Potential solutions at the bottom line in strengthening regional and multilateral bodies to offer guidance in designing tax policies beneficial to all members and protect them from unregulated pressure.

It is therefore recommended:
• That regular effort should be made by macro managers to ensure that macroeconomic policies do not unfairly impinge against floriculture. Further, micro and sector-specific policies should be pursued to ensure that growers get the right signals and are not unfairly disadvantaged by the policies in place.

• The government make clear attempts to use more efficient methods of taxing floriculture, as indeed it must, without distorting the relative incentives. It is also imperative that in order to improve the competitiveness of floriculture Vis-a Vis products from elsewhere, due regard should be given to making appropriate productivity-enhancing investments in floriculture,
such as rural infrastructure, agricultural extension, irrigation and technology.

•In future, research be undertaken to explore the viability of implementing better tax regime and designing a feasible specific levy.

In addition the government should:
• Identify the various other indirect taxes used in the flower sector and assess the extent to which these have made the sector less competitive.

• Empirically analyse the extent to which trade and macroeconomic policies have provided overriding incentives or disincentives to flower sector and therefore indirectly taxed the sector

•Draw conclusions, based on the findings from the foregoing, and make policy recommendations on the way forward.

•Offer tax relief to innovative companies on their research and development spending.

•Bring in specific technical assistance where there are particular problems.

•Have an active floricultural research programme delivered through a widespread extension service.

•Subsidize in improving the quality of the workforce. The training of unskilled labour puts a major cost onto any flower farm. Training schemes to encourage the development of middle management and senior are needed.

Policy and policy guidelines in the leading flower exporting countries
This section offers a bird's eye view of the key government policies towards the flower industry in the major flower growing countries. It is determined to what extent these policies support the competitiveness of the flower

In addition, the counties have also introduced branding taxes where branded vehicles have to remit levies to any county they pass through at different rates.

Taxes and Levies

An overview of the taxes and levies in the flower industry:

- Export levy of KSh 0.2 per kilo of every produce being exported – HCDA.
- Local market levy per weight or by tonnage of the truck – Local Authority.
- A phytosanitary services levy KSh 0.2 per kilo of produce exported.
- Phytosanitary certificate levy of KSh 400 per certificate – KEPHIS.
- Water levy of KSh 0.37 per litre of irrigation water – WARMA.
- A minimum levy of US$ 400 for composting organic matter – NEMA.
- Tax on land payable to the local government.
- Personal and income taxes for all the permanent and pensionable staff.

Despite the higher costs due to multiplicity and duplication of taxes by the national and county governments, the sector has continued to bloom but how long can it hold.

Kenya can redeem itself and save the sector from a slump. Double taxation is discouraging new investors eyeing flower industry, making many growers venture into Ethiopia where cost of production has been reduced.

This has opened growing competition, mainly by the fast growing Ethiopian flower industry that enjoys heavy subsidies from the government, stoking fears that it could overtake Kenya in both production and exports.

Investors in the flower sector should enjoy the following:

- 10-year corporate income tax holidays.
- 10-year withholding tax holiday on dividends and other remittances to non-resident parties.
- Perpetual exemption from VAT and customs import duty on inputs (greenhouses, greenhouse covers, and cold chain systems).
- Subsidised dam construction and irrigation equipments.
- Subsidised capital equipment and other resources.
- Perpetual exemption from payment of stamp duty.
- Subsidised financing loans.

The justification for this tax incentivisation should be based on the argument that:

1. Increased government revenue.
2. More inward investments which will lead to job creation
3. It will lead to technology/ know-how spill over
4. Facilitate a backward/forward linkage to local economy

Government revenue

Attraction of more investors and retention

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business.

The national Horticultural Policy document needs to be implemented to accelerate and sustain growth and development of the horticultural industry in order to enhance its contribution towards food security, poverty reduction, employment and wealth creation.

More specifically, policy objectives for the realisation of the broader objective are to:

- Facilitate increased production of high-quality horticultural produce.
- Enhance provision of the sub-sector's support services.
- Promote value addition and increase domestic and external trade.
- Establish and develop infrastructure to support the horticulture industry.
- Establish and strengthen institutional, legal and regulatory framework in the horticultural industry.
- Promote mechanisms for environmental sustainability and other cross-cutting issues.

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of flower firms will attract more revenue to the government. Despite some economists arguing of government tax loss, there are no concrete numbers of the amount of revenue that governments incurs through tax incentives. However, this will widen the tax net further, create employment, improve living standards and plough more businesses in the country.

Urban Rural Migration

The arguments that high numbers of people moving from other parts of the country to work in the flower farms has severely overstretched the facilities at host county governments is misplaced. The authorities are not able to provide adequate education, health and housing facilities due to the massive population increase. This is a big lie that doesn't consider the number of investors in the housing sector moving to the areas; the high purchasing power in the area, more cash flow hence increases of trade.

Floriculture is a rural investment. Encouraging more investors into the sector will reverse the ever growing rural urban migration.

Job Creation.

According to statistics the flower sectors has created thousands of jobs in Kenya. Arguments have been put forward that over 75% of the jobs are casual labourers earning on average US$40 per month, which is 33 cents above the one dollar per day poverty level margin. In other words the employment creation has been meagre with the workers sustained in perpetual poverty.

This is a big lie, Over 75% of the workers in the flower sector are within the tax bracket for they earn over Ksh.15,000. Floriculture has the highest wages in the agriculture sector with computerized payroll systems hence the highest personal income tax payer in agriculture. So, it is true that job creation benefits have been achieved or but not actually manufacturing poverty and oppression.

Technology / Know-how Transfer.

Technology transfer from multinationals to small scale growers is immense. With the introduction of very stringent market regulatory standards many small scale growers have heavily benefited. However, the national agricultural research institutions have not been able to benefit due to their stringent regulations.

Forward/Backward Linkages.

Investments in the flower sector are not footloose investments, they are capital and intensive. They are not short-term investments that are not rooted in the local economy as it has been argued by some economists. Linkages between the cut flower industry and the domestic economy is not limited to labour, but a new and integral part of the national economy.

Considering the nature of investments, it may not be easy to create a short term nature of investments attracted by these tax incentives hence avenues for exploitation as companies move to new jurisdictions after the expiry of their tax holidays.

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BENEFITS OF AGRIXYL 407

- Provides effective control of Downy Mildew and Phytophthora diseases on a wide range of crops
- Is formulated from a non-toxic potassium phosphite base with added Metalaxyl
- Systemic action provides complete translocation throughout the plant to ensure effective control to all diseased plant parts. Protective action to limit reinfection.
- Can be applied with a wide range of other agricultural chemicals, reducing the number of spray applications needed
- Compatible with Integrated pest management programs
- When used as directed the risk to non-target organisms in terrestrial and aquatic environments is very low
- Minimal cross resistance effect due to unique formulation of metalaxyl and phosphite

MODE OF ACTION

The potassium phosphite in AGRIXYL 407 is absorbed by the plant and translocated via the xylem and phloem to all parts of the plant. It is directly fungistatic - ie: it slows the growth of the disease pathogen and inhibits the formation of spores.

Disease invasion and prevention in the presence of phosphite

1. Pathogen is affected by phosphite
2. Suppressors either under or not produced
3. Recognition of disease by plant cell
4. Phosphite encourages defensive molecules, such as phytoalexlexins and PR proteins, to attack the disease directly; and
5. Defensive molecules send "alarm signals" to cells that have not yet been attached, then
6. Polysaccharides strengthen the cell wall adding additional protection
7. Disease is limited or killed by plant response.

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FLOWER & VEGETABLE FARMS IN KENYA

FARM NAME	PRODUCT	LOCATION	CONTACT PERSON	TELEPHONE	E-MAIL
AAA- Flowers-Rumuruti	Roses	Rumuruti	Charles Njuki	0724 391 288	charles.njuki@aaagrowers.co.ke
AAA- Flowers -Chui Farm	Roses	Timau	Ravi Kumar	0759 500403	ravikumar@aaagrowers.co.ke
Farm-Sunripe		Naivasha	Antony	0711827785	naivasha@sunripe.co.ke
Across Agriculture Ltd	Herbs	-	Emily Chepkemoi	0729080186	chep28@gmail.com
Africalla Kenya Ltd	Cuttings	Eldoret	Meindert	-	meindert@africalla.com
Africa Blooms	Roses	Salagaa	Ramnath Sarbande	0780314387	ramnath.sarbande@xflora.net
Afriscan Kenya Ltd	Hypericum	Naivasha	Charles Mwangi	-	-
Aquila Development Co	Roses	Naivasha	Abhay Marathe	0729776656	gm@aquilaflowers.com
Balaji Flowers	Roses	Olkalou	Ra0 Venkatesh	0726337266	-
Baraka Farm	Roses	Ngorika	Lucy Yinda	-	lucy@barakaroses.com
Batian Flowers	Roses	Nanyuki	Dirk Looj	0720102237	dirk@batianflowers.com
Beautyline	Flowers	Naivasha	Peter Gathiaka	0721392559	peter@beautyli.com
Big Flowers	Roses	Timau	Simon Blinco	0723234927	simon@mauflora.co.ke
Bigot Flowers	Flowers	Naivasha	Kakasaheb Jagtap	0722205271	jagtap.kt@bigotflowers.co.ke
Bila Shaka Flowers	Roses	Naivasha	Joost Zuurbier	0722204489	bilashaka.flowers@zuurbier.com
Black Petals	Roses	Limuru	Nirzar Jundre	0722848560	nj@blackpetals.co.ke
Bliss Flora Ltd	Roses	Njoro	Appachu Sachin	0789101060	appachu7@yahoo.com
Blue Sky	Gypsophilla	Naivasha	Patel Sushant	0725622333	info@blueskykenya.com
Bloom Valley		Salgaa	Ramnath Sarbande	0780314387	ramnath.sarbande@xflora.net
Blooming Dale Roses Kenya Ltd	Roses	Nanyuki	Sunil	0718991182	info@bloomingdaleroses.com
Buds and Blooms	Roses	Nakuru	Shivaji Wagh	0720895911	shivaniket@yahoo.com
Carzan (K) Ltd KS	Summer flowers	Salgaa	Stanley Rotich	0721931710	stanley@carzankenya.com
Carzan (K) Ltd ST	Hypericum, solidago		Adung'o	0716019094	adung'o@carzankenya.com
Carzan - Molo	Carnations	Molo	Charles Chelule	0728784081	charles.chelule@carzankenya.com
Charm Flowers	Flowers	Athiriver	Ashok Patel	020 352583	ashki@charnflowers.com
Chestnut	Flowers	Mt. Kenya	Gabriel Kiai	-	gabriel.kiai@aaagrowers.co.ke
Colour Crops	Hypericum	Nanyuki	Kennedy Wanyama	0716389472	colourcrops@tmu.com
Colour crops	Summer Flowers-	Bahati	Patrick Kipkurui	0727806184	kipkirui89@gmail.com
Colour crops Naivasha	Flowers	Naivasha	Geoffrey Mwaura	0722200972	nva@colourcrops.com
Credible Blooms	Flowers	Rumuruti	Eliud Njenga	0722382859	eliud@pigeonblooms.com
Credible Blooms	Flowers	Ngong	Eliud Njenga	0722382859	eliud@pigeonblooms.com
Dale Flora	Roses	Mogotio	Ajay Sutar	0711102266	ajay.sutar24@gmail.com
Desire Flowers	Flowers	Isinya	Rajat Chaohan	0724264653	rajatchaohan@hotmail.com
De ruiters	Breeder Roses	Naivasha	Fred Okinda	0722579204	Fred.okinda@deruiter.com
Double Dutch	Cuttings	-	Pharis Wainaina	0728207661	
Dummen Orange	Flowers Breeders	Naivasha	Steve Outram	0733 609863	s.outram@dummenorange.com
Eco Flora	Roses	Salgaa	Kimani	0733605219	production@fontana.co.ke
Elbur flora- kimman	Roses	Nakuru	Daniel Moge	0721734104	kimmanexp@gmail.com
Enkasiti Thika	Flowers	Thika	Tambe	0734256798	enkasiti@gmail.com
Equinox	Flowers	Nanyuki	Harry Kruger	0707266956	harry@equinoxflowers.com
Everest Flowers Ltd	Flowers	Mt. Kenya	-	-	-
Everflora Ltd.	Flowers	Thika	Bipin Patel	0735873798	everflora@dmblgroup.com
Evergreen Crops		Nairobi	Arun Singh	0721941009	arun@evergreencrops.com
Exotic Peninah	Roses/ Carnations	Athiriver	Dan	0734626942	dan@exoticfields.com
Fairy Flowers	Flowers	Limuru	Sylivester	0753444237	sylvesterkahoro@yahoo.com
Fides Kenya Ltd	Cuttings	Embu	Bernard Marindany	0726 366 752	B.Marindany@DummenOrange.com
Finlays -Tarakwet	Flowers	Kericho	Lelon Chepkwony		
Finlays Chemirel	Flowers	Kericho	Aggrey Simiyu	0722601639	aggrey.simiyu@finlays.co.ke
Finlays- Lemotit	Flowers	Kericho	Japhet Langat	0722 863527	japhet.Langat@finlays.co.ke
Fontana Ltd - Akina farm	Roses	Njoro	Mahindra Patil	0798254199	--
Fontana Ltd - Ayana Farm	Roses	Mau Narok	Aiyappa		aiyapa@fontana.co.ke
Flamingo Holdings Farm	Flowers	Naivasha	Peter Mwangi	0722204505	peter.mwangi@flamingo.net
Flamingo Holdings-Kingfisher Farm	Flowers	Naivasha	Mr. Isaac Karanja	0720473502	kingfishercarnations@flamingo.net
Flamingo Holdings- Kingfisher Farm	Flowers	Naivasha	Jacob Wanyonyi	0722773560	jacob.wanyonyi@flamingo.net
Flamingo Holdings-Siraji Farm	Carnations, Roses	Nanyuki	Peris Muturi	-	-
Flamingo Flora	Roses	Njoro	Sam Nyoro	0721993857	s.ivor@flamingoflora.co.ke
Flora ola	Roses	Solai-Nakuru	Lucas Choi	0721832710	lucas.floraola@gmail.com
Flora Delight	Summer flowers	Kiambu/ Limuru	Marco	0710802065	marcovansandijk@yahoo.com
Florensis Ltd	Cuttings	Naivasha	Anne Marie		annemarie@florensis.co.ke

FLOWER & VEGETABLE FARMS IN KENYA

FARM NAME	PRODUCT	LOCATION	CONTACT PERSON	TELEPHONE	E-MAIL
Florenza Ltd	Roses	Solai	Yogeesh	0737453768	farm.florenza@megaspingroup.com
Fresh Gold Flowers Ltd	Flowers	Mt. Kenya	John Karimi	0721622294	karimi@freshgolgkenya.co.ke
Gatoka Roses	Roses	Thika	Herman Njuguna	0728 854 844	info@gatokaflowers.com
Golden Tulip	Roses	Olkalao	Umesh Choudhery	0739729658	umesh@bth.co.ke
Groove	Flowers	Naivasha	John Ngoni	0724448601	groovekenya@gmail.com
Hanna Roses Ltd	Roses	Thika	Kadlag Palaji	0723149968	kadlag.paraji@hannaroses.com
Harvest Flowers Group	Roses	Murungaru	Paul Salim	0722 470 717	paul.salim@harvestflowers.com
Harvest Ltd	Roses	Athiriver	Paul Salim	0722 470 717	paul.salim@harvestflowers.com
Heritage Flowers Ltd	Roses		Shailesh Kumar	0722203750	hfl.srk@gmail.com
Highland plantations	Cuttings & Herbs	Olkalau			production@highlandplants.co.ke
Imani Flowers	Summer Flowers	Nakuru	Raphael Otieno	0792302466	raphael@imaniflowers.co.ke
Interplant Roses	Roses	Naivasha	Gavin Mourittzen	0733220333	info@interplantea.co.ke
Isinya	Flowers	Isinya	Rajesh	-	pm@isinyaroses.com
Karen Roses	Flowers	Nairobi	Peter Mutinda	0723353414	pmutinda@karenroses.com
Kariki Ltd- Thika	Flowers	Thika	Mirium	-	production@kariki.co.ke
Kariki Ltd - Nanyuki	Eryngiums	Nanyuki	Richard Fernandes	062-31023/6	bondet.production@karik.biz
Kariki Ltd - Naivasha	Hypericum	Naivasha	Peter Kamwaro	0721758644	hamwe.fm@kariki.biz
Kariki Ltd - Molo	Fowers	Molo	James Oluoch	0716333717	jame.oluoch@kariki.biz
Kariki - Hamwe	Hypericum	-	Benjamin Ribai	0723721748	hamwe.fm@kariki.biz
Kenflora Limited		Kiambu/ Limuru	Abdul Aleem	0722311468	info@kenfloraa.com
Kentalya	Cuttings	Naivasha	Linnet	0733549773	lynette@kentalya.com
Kisima Farm Ltd	Roses	Timau	Craig Oulton	0722205828	craig@kisima.co.ke
Kordes Roses	Roses- Breeders	Karen	Luce	0735995566	info@kordes-ea.com
Kongoni River Farm - Gorge Farm	Roses	Naivasha	Anand Patil	0728608785	anand.patil@vegpro-group.com
Kongoni River Farm - Liki River	Flowers	Nanyuki	Madhav Lengare	0722202342	madhav@vegpro-group.com
Kongoni River Farm - Star Flowers	Flowers	Naivasha	Prabhakaran. M	0743078733	prabhakaran@vegpro-group.com
Kongoni River Farm - Kongoni	Flowers	Timau	Oppaso Bandgar	07120070053	oppasobandgar@vegpro-group.com
Kongoni River Farm -Bemack	Flowers	Timau	Mangesh	0797 874583	
Kongoni River Farm - Galaxy	Roses	Naivasha	Kiran Nangare	0787787544	kiran@vegpro-group.com
Kongoni River Farm- Longonot	Roses	Naivasha	Rakesh Kuttaiah	0724631299	rakesh.kuttaiah@vegpro-group.com
Lamorna Ltd	Roses	Naivasha	Mureithi	0722238474	admin@lamornaflowers.com
Lathyflora		Limuru	Mbauni John	0753888126	info@lathyflora.com
Lauren International	Flowers	Thika	Chris Ogutu/Carlos	0722783598	laurenflowers@accesskenya.co.ke
Laurel Investment	Roses	Nakuru	Rajendra Jadhav	0738359459	rajendra.laurel@bht.co.ke
Livewire	Hypericum	Naivasha	Esau Onyango	0728606878	management@livewire.co.ke
Lolomarik	Roses	Nanyuki	Topper Murry	0715 727991	topper@lolomarik.com
Magana	Roses	Nairobi	Geoffrey Suguvi	0720806239	assistantntproduction
Mahee Flowers	Roses	Olkalao	Natarajan	0738999149	natarajan@eaga.co.ke
Maridadi Flowers	Flowers	Naivasha	Jack Kneppers	0733333289	jack@maridadiflowers.com
Maua Agritech	Flowers	Isinya	Madan Chavan	0738669799	production@mauaagritech.com
Mau Flora	Roses	Molo	Mahesh	0787765684	mahesh@mauflora.co.ke
Milenium Growers	Summer Flowers	-	Sushant Wankara	0731316000	sushant@marvelgreens.com
Molo Greens	Solidago, carnations	-	Justus Metho	0722755396	justus@mologreens.com
Mt. Elgon Flowers	Roses	Eldoret	Bob Anderson	0735329395,	bob@mtelgon.com
Mwanzi Flowers Ltd	Roses	Rumuruti	Ram	0722265845	-
Mzuurie Flowers - Maji Mazuri	Roses	Eldoret	Mark Juma	0727471034	mjuma@majimazuri.co.ke
Mzuurie Flowers - Molo River Roses	Flowers	Kilelwa	Andrew Wambua	0724256592	awambua@moloriverroses.co.ke
Mzuurie Flowers - Winchester Farm	Roses	Karen	Raphael Mulinge	0725848909	rmulinge@winchester.co.ke
Mzuurie Flowers - Winchester Farm	Flowers	Bahati	Raphael Mulinge	0725848909	rmulinge@winchester.co.ke
Nini Farms	Roses	Naivasha	Philip Kuria	0720611623	production@niniltd.com
Nirp East Africa	Roses	Naivasha	Danielle Spinks	0702685581	danielles@nirpinternational.com
Ol Njorowa	Roses	Naivasha	Charles Kinyanjui	0723986467	mbegufarm@iconnect.co.ke
Oserian	Flowers	Naivasha	Christine Karambu	0702350689	christine.karambu@oserian.com
Panda Flowers	Roses	Naivasha	Geofrey Kanyari	0712215419	farm.manager@pandaflowers.co.ke
Panocol International	Roses	Eldoret	Mr. Paul Wekesa	0722748298	paul.wekesa@panocal.co.ke
Penta	Flowers	Thika	Tom Ochieng	0723904006	tom@pentaflowers.co.ke
Pendekeza	Roses	Nanyuki	Richard Siele	0722716158	tambuzi.sales@tambuzi.co.ke
PJ Dave Flowers	Flowers	Isinya	Sanjiv Dogra	0737576966	pjdaveflowers@wananchi.com

FLOWER & VEGETABLE FARMS IN KENYA

FARM NAME	PRODUCT	LOCATION	CONTACT PERSON	TELEPHONE	E-MAIL
PJ Flora	Roses	Isinya	Santos Kulkarni	0738990521	santosh@pjdave.com
Plantech Kenya Ltd	Propagators	Naivasha	Idan Salvy	0702187105	idan@plantechkenya.com
Porini Flowers	Roses	Molo	Vivek Sharma	0731040498	gm@poriniflowers.com
Primarosa Flowers Ltd	Roses	Olnjororok	Jai Prakash	0780785603	production.mp2@primarosaflowers.com
Rain Forest Farmlands Ltd	Roses	Naivasha	Lucas Onena Ongere	0718925040	longere@fleurafrica.com
Ravine Roses Flowers	Flowers	Nakuru	Peter Kamuren	0722205657	pkamuren@karenroses.com
Redland Roses	Flowers	Thika	Aldric Spindler	0733603572	aldric@redlandsroses.co.ke
Redwing Flowers	Flowers	Nakuru	Simon Sayer	0722227278	sayer@redwingltd.co.ke
Rift Valley Roses (K) Ltd	Flowers	Naivasha	Peterson Muchiri	0721216026	fm@riftvalleyroses.co.ke
Rimiflora Ltd	Hypericum	Njoro	Richard Mutua	0722357678	richard@rimiflora.com
Riverdale Blooms Ltd	Flowers	Thika	Antony Mutugi	0202095901	rdale@swiftkenya.com
Roseto	Roses	Roseto	Aravind	0786157344	gm.roseto@megaspingroup.com
Savannah international	Geranium	Naivasha	Ignatius lukulu	0728424902	i.lukulu@savanna-international.com
Selecta Kenya		Thika	Robert Khamala	0727 467 464	r.khamala@selectakenya.com
Sojanmi Spring Fields	Roses	Njoro	Ashesh Mishra	0792217088	ashesh@xflora.net
Schreus	Roses	Naivasha	Haiko Backer	-	-
Shades Horticulture	Flowers	Isinya	Ashutosh Mishra	0722972018	info@shadeshorticulture.com
Shalimar Flowers	Flowers	Naivasha	Dinkar Wandhekar	0702418174	dinkar@eaga.co.ke
Sian Roses - Maasai Flowers	Flowers	Isinya	Anthony Kipng'eno	-	-
Sian Roses - Agriflora (K) Ltd	Roses	Nakuru	Charles Mulemba	-	cmulemba@sianroses.co.ke
Sian Roses - Equator Roses	Roses	Eldoret	Nehemiah Kangogo	0725848910	nkangogo@sianroses.co.ke
Sierra flora	Roses	Njoro	Sharieff	0787243952	farm.sierra@megaspingroup.com
Simbi Roses	Roses	Thika	Karue Jefferson	067 44292	simbi@sansora.co.ke
Sirgoek Flowers	Flowers	Eldoret	Andrew Keittany	0725 946429	sirgoek@africaonline.co.ke
Solai Milmet/Tindress	Flowers	Nakuru	Jagtap	0733996202	solairoses@gmail.com
Subati Flowers	Roses	Subukia	Naren Patel	0712 584124	naren@subatiflowers.com
Subati Flowers	Roses	Naivasha	Naren Patel	0712 584124	naren@subatiflowers.com
Suera Flowers Ltd	Roses	Nyahururu	George Kimathi	0724622638	gkbuuri@gmail.com
Sunfloritech	Roses	-	Peter Wekesa	0729163607	-
Sunland Timau Flair	Roses	Timau	Ken Mwiti	-	info@lobelia.co.ke
Stockman rozen	Roses	Naivasha	Julius muchiri	0708220408	julius@srk.co.ke
Syngenta Flowers - Kenya Cuttings	Flowers	Thika	Kavosi Philip	0721225540	philip.munyoki@syngenta.com
Syngenta Flowers - Pollen	Flowers	Thika	Joseph Ayieko	0733552500	joseph.ayieko@syngenta.com
Tambuzi	Roses	Nanyuki	Richard Siele	0722716158	tambuzi.sales@tambuzi.co.ke
Terrasol	-	Nairobi	Jacques	0705 519 633	jacques@pvdhaak.nl
Timaflor Ltd	Flowers	Nanyuki	Simon van de Berg	0724443262	info@timaflor.com
Top Harvest	Roses	-	Pius Kimani	0721747623	pius.kimani@gmail.com
Transebel	Flowers	Thika	David Muchiri	0724646810	davidmuchiri@transebel.co.ke
Uhuru Flowers	Flowers	Nanyuki	Ivan Freeman	0713889574	ivan@uhuruflowers.co.ke
Utee Estate	Chrysanthemums	Nairobi	Appaso Mane	0737 513 844	mane.uel@btfgroup.com
United Selections	Roses -Breeder	Nakuru	Fred Kisumo	0720107691	fkisumo@united-selections.com
V.D.Berg Roses	Flowers	Naivasha	Johan Remeeus	0721868312	johan@roseskenya.com
Valentine Ltd		Kiambu/Limuru	Joseph Kariuki	0728 093 379	joseph.kariuki@valentinegrowers.com
Van Kleef Kenya Ltd	Roses		Judith Zuurbier		roses@vankleef.nl
Van Kleef Ltd	Roses	Njoro	Karan Mandanna	078500460	karan@vankleef.nl
WAC International	Breeder	Naivasha	Richard Mc Gonnell	0722810968	richard@wac-international.com
Waridi Ltd		Athi River	Julius Ruto	-	farmmanager@waridi.com
Wilham Kabuku	-	Nairobi	Natarajan	0735 792 063	natarajan@eaga.co.ke
Wildfire	Roses/summer	Naivasha	Eliud Kimani	0727598349	roses@wildfire-flowers.com
Wilfay Flowers	Gypsophila/hypericum	Subukia	Makori	0723358644	makoriwilfay@gmail.com
Wilmar Agro Ltd	Summer Flowers	Thika	Alice Muiruri	0722 321203	alice.muiruri@wilmar.co.ke
Windsor		Thika	Pradeep Bodumalla	0736 586 059	farm@windsor-flowers.com
Xpressions Flora	Roses	Njoro	Brijesh Patel	0715469732	brijesh.patel@xflora.net
Zena - Asai Farm	Roses	Eldoret	Phanuel Ochunga	0722506026	pochunga@zenaroses.com
Zena Roses - Sosiani Farm	Roses	Eldoret	Jackson Mbanya	-	-

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