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THE LEADING FLORICULTURAL JOURNAL IN THE REGION

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FLOWER INSIGHTS

The complexity of insect pests

THRIPS

Thrips are among the most common and difficult insect pests to manage in commercial ornamental production. They are small in size ranging from 1/16 to 1/8 inch in length and can vary in color from yellow to brown to black. Both adults and larval stages feed on plant tissue with rasping-sucking mouthparts.

Most thrips feed on leaf tissue but some species can be very damaging to young flower buds causing deformation or failure to open. In addition to direct damage, thrips are capable of transmitting plant viruses making thrips management critical. Thrip damages are predisposing factors for botrytis in Roses.

WHITEFLY

Whiteflies colonies typically develop on the undersides of leaves, laying tiny oblong eggs ranging from yellow to white in color. After they hatch, the young whiteflies go through four nymphal stages, with winged adults emerging from the last stage.

All stages of whiteflies feed by sucking plant juices from leaves and excreting excess liquid as drops of honeydew. In addition to the destructive feeding damage, the honeydew excretions provide a source of nutrition for sooty mold fungi. Sooty mold fungi readily colonize plant tissues as they feed on the honeydew, causing any affected surfaces to blacken from an abundance of spores and ultimately reducing overall plant quality.

APHIDS

Aphids are among the most common insect pests on plants. Many species of aphids feed on ornamental nursery and greenhouse crops. Aphids have tremendous reproductive potential and in large numbers can cause significant damage and reduce plant quality. Most adult aphids are about an eighth of an inch long, pear-shaped and can vary widely in color from green to yellow, pink or black.

They are soft-bodied insects and often possess a pair of hornlike structures known as cornicles at the posterior end of the abdomen. Winged aphids hold their wings vertically above the body when at rest. Feeding aphids often cause new growth to become deformed where the leaves twist and curl, which could be mistaken as herbicide damage. Severe infestations can result in wilting and even plant death.

MEALYBUGS

Mealybugs damage plants by sucking sap, causing yellowing, stunted growth, galls and dieback. They also excrete honeydew which attracts Wasps, Ants and Bees and can serve as a medium on which Sooty Mold can grow. Immature mealybugs are very active, moving all around a plant looking for an optimal feeding spot.

As they mature, they become more inactive, with very little movement. When hidden in areas like the lower stems underneath the leaves or branches and leaf axles, they remain there for long. They are hard to spot and when that happens, you get a small population and the suddenly start to explode.

Insect Pest Management

Cultural Control

- Frequent inspection of plant material is essential to prevent rapid buildup of insect population in nurseries and greenhouses, including prior to moving them into production area.
- The use of yellow or blue sticky cards can be a useful tool for monitoring thrips populations.
- Many weeds are susceptible hosts for and should be removed or controlled with herbicides.
  -Remove and dispose of old stock plants and crown galls.
  -Infested plant hosts and plant debris serve as reservoirs for insect infesting new plants.
  -Sanitation is an important tactic in managing thrips.

Chemical Control: Insecticide solutions from Bayer Crops Science

PRODUCT	ACTIVE INGREDIENT	IRAC GROUP CODE	TARGET PEST	RATE/HA
calypso	Thiocloprid 480g/l	Neonicotinoids (4A)	Aphids, Whiteflies, Thrips	0.2-0.4lt
Confidor WG 70	imidacloprid 700g/kg	Neonicotinoids (4A)	Aphids, Mealy bugs, Whiteflies, Leafminer, Thrips	Drip: 1.2 - 1.5 kg /ha
decis EC	Deltamethrin 25g/l	Pyrethroids (3A)	insects pests	0.3-0.5lt
MOVENTO	spirotetramat 150g/l	Tetramic Acid (23)	Sucking insects (mealy bugs, whiteflies and aphids) and Red spidermites	0.24 - 1.2 L
SIVANTO prime	Flupyradifurone 200g/l	Butenolide (4D)	Aphids, white flies, thrips, mealy bugs	1l/ha Aphids - 0.75l/ha
REQUIEM	Terpenoid blend	None	Mites, Whiteflies, Thrips	5 lts

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Recap on

Confidor WG 70

By drenching Confidor WG 70®, the grower will achieve maximum coverage because the product will be taken through the evapotranspiration pull to all the various parts of the plant even to dense canopies not reached by foliar spray. Secondly, drench ensures that there is a continuous protection for the newly formed shoots even after sprayed stems are harvested. Other insects like thrips and whiteflies are controlled with this drench.

Confidor WG 70® additionally confers the stress shield effect on the plant roots against abiotic factors.

For more information please contact: Maurice Koome: 0704 411 325, **Simon Ngucugua:** 0704 411 301, **Simon Kihungu:** 0704 411 315

Contents

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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Sustainable Development

Sustainable development is defined as 'meeting the needs of the present without compromising the ability of future generation to meet their own need'.

Sustainability is a dynamic concept born out of the environmental debate of the last quarter century. In order to achieve a sustainable life, a balance and equal distribution of natural resources is necessary throughout the world so that basic needs of each and every living being may be fulfilled.

There is growing concern nationally and internationally about biodiversity and protection of plants and animals and community based activity. It is important to view sustainable efforts from global perspective that addresses socio-economic and environmental issues.

Although the fears about such unsustainable growth and development have been there, it is now or never every development must be sustainable to avert serious issues.

This is the time to emphasise on economic growth and poverty alleviation for sustainable development. The basic prerequisite of sustainable development is the evolution of a development process with focus on the enhancement of the living conditions of population as a whole with emphasis on raising the standard of living of the poor.

Companies must develop strategies for sustainable development to translate the words and commitments into concrete policies and actions. The important issue in the 21st century is to create greater economic and societal well-being without deterioration of the environment and depletion of the resources.

Flower farms and their partners should not be left behind.

Thanks in advance,

Masila Kanyingi
Editor

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Kenya Flower Industry Global Competitiveness

Changing market conditions

- **Direct trade channels, bypassing the Dutch auction system, are on the rise**
- **Virtualisation of the trade**
- **Increased competition with Latin America in upcoming direct markets (Russia, Japan)**

Factors For a Competitive Floricultural Business Environment (In No Particular Order)

Macroeconomic Environment	Regulatory Business Environment	Broader Investment Climate
• Gross domestic product (GDP) • Inflation • Employment • Spending • Monetary and fiscal policy	• Starting, operating and closing a business • Property entitling • Credit and finance (financial markets) • Investor protection • Tax system • Trading across borders (trade regulations, customs) • Enforcing contracts • Labour regulations	• Security (rule of law, political stability) • Getting electricity • Infrastructure • Health system • Sector cooperation (clustering, inter-firm linkages) • Knowledge and technology (education, research, innovation) • Inputs • Services

There is a general notice that the industry is changing dramatically. In recent years, consumption has stagnated in major markets, while the supply of flowers remained abundant. In the medium and long term, a moderate growth of only 2 to 4% annually is expected in Western Europe's flower markets.

In the traditional florist channel, which continues to be the largest market segment, direct trade from producer to end market is increasing, particularly in those markets further away from the Netherlands.

In addition, the flower value chain is increasingly dominated by large and sophisticated European supermarkets and other mass-market retailers. This is resulting in a gradual shift of purchasing power from wholesalers and the Dutch auction system towards these mass-market retailers. Supermarkets tend towards single-sourcing, based less on price (as the Dutch auction system) and more on quality, delivery reliability and traceability. These large retailers are increasingly laying down quality standards, which are becoming more stringent and increasingly differentiated. Demand for sustainably produced and distributed products is rising.

"Our love of flowers might seem frivolous, but it drives a worldwide industry worth billions of pounds.

While the Netherlands dominates the trade, countries on the equator are becoming increasingly important as growers."

There is also an acceleration of technology and knowledge development, not only in cultivation, but particularly in the way flowers are traded. More than 60% of the roses traded at the FloraHolland auction are sold through the remote buying system. European wholesalers offer products in their own online web shop, where customers (wholesalers and retailers) can buy directly from stocks. Trade becomes virtual making consistency and accurate exchange of information critical.

Margins under pressure

- **Rising costs**
- **Need for continuous improvement**
- **Chain integration**

In all producer countries, production and logistics costs are rising (labour, fuel, airfreight, inputs, energy, taxes, etc.), while prices will remain under pressure in the long run. As a result, margins are getting squeezed.

To remain competitive, farms are required to continuously improve their efficiency. This principle actually applies to the entire sector as a whole. Joint sector and public-private efforts are needed to gain efficiencies in the value chain.

The industry is evolving towards lean and transparent value chains characterised by

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consolidation and vertical integration.

Challenges Facing the Sector

What determines the success of a national cut flower export sector, not only in Kenya, but in a number of leading flower producing countries. Some issues are typical for their local situation. Mostly, however, growers globally face similar issues, either production, logistics or marketing-related. For a large part, their success is determined by their entrepreneurial and growing skills. Still, literature and interviewed growers also agree that the business environment is a critical factor.

There are couple of big issues that way heavy on the competitiveness of the Kenyan flower industry such as political stability, safety, corruption and bureaucracy. One of the main daily concerns of growers, however, not only in Kenya but also abroad, are the ever rising costs. Rising costs are not only related to production factors as labour, energy and inputs, but also the costs of logistics and doing business in general.

Most relevant cost items:

- **Production-**related costs: labour, chemical inputs, energy
- **Logistical costs:** airfreight, packaging, paperwork, fuel
- **Costs of doing business:** taxes and levies, bureaucracy, security

As price levels remain under pressure and are not expected to rise, there is a clear need for efficiency improvement. Competing countries are moving forwards fast.

For the mid and long term future, there are five vital challenges for the Kenyan flower industry to retain or strengthen its competitiveness in the global flower markets:

- **Efficiency improvement**
- **Sustainability**
- **Supply chain improvement**
- **Sector promotion**
- **Public sector**
- **coordination**

Efficiency improvement

- **Productivity**
- **Pest management**
- **Innovation**

In terms of **production costs**, ample opportunities for efficiency gains exist. In the case of the costs of labour, the two main options are either to work on **worker productivity and skills development** or on **mechanisation**. As we have seen, skills level of Kenyan personnel is high by developing world standards and receives attention through education, practical training centre, etc. However, compared to Latin American and European competitors, there is still ample room for improvement. Furthermore, growers indicate that they believe they can further increase general worker productivity.

Note also the effect of a shift in rose assortment from small & medium-sized varieties towards larger rose varieties. In case of small to medium-size roses, labour costs comprise about 30 to 35% of total production costs, compared to only 20 to 25% in case of large varieties.

It has been identified a general lack of truly innovative enterprises. The most likely explanation for this is a combination of the traditional surplus of unskilled labour, a lack of access to adequate technology and knowledge institutes which have not been able to produce applicable technology for the local flower industry.

Some Kenyan farms experiment with mechanical grading and other forms of mechanisation. Many farmers, however, are hesitant if this is really appropriate technology for Kenya. At this stage, most Kenyan farms require medium-level technology, which is often not readily available.

Many administrative tasks on the farms are still carried out by hand and on paper. With the increasing importance of information and the move towards direct trade, farms will have to automate system administration to stay competitive.

Pest management practices and in particular an adequate application of chemicals in cultivation are other areas in which farms can further improve efficiency.

Sustainability Market requirements

- **Compliance issues**
- **SME growers losing ground**

Compliance to international standards regarding quality, workers' health, safety and rights, and environmental sustainability are a precondition for European market access, particularly in the direct channel supplying mass market retailers. Majority of the growers are certified for one or more quality standards. Nevertheless, nation-wide compliance is an issue and negative publicity is regularly the result.

What's more, enforcement of government regulations like the environment-related NEMA licensing remains weak in Kenya. In other countries, a sound regulatory environment is combined with more stringent enforcement of government regulations.

Supply chain improvement

- **Cold chain management**
- **Transport and logistics**
- **Packaging**
- **Handler performance**
- **Information and communication**

It is clear that the sector would benefit greatly from improved coordination among public institutions and between the public and private sector. A coordinated effort is needed to lift the Kenyan business enabling environment to more competitive levels.

Since flowers are highly perishable by nature, speed of delivery is critical, as are appropriate temperature control measures during transit. The strong growth in export volumes, however, has put pressure on the supply chain, creating bottlenecks that hinder efficiency and further development.

Studies show that there are many opportunities for efficiency gains along the entire value chain.

With the strong and continued development of direct marketing lines, Nairobi has the opportunity to develop into an important trading centre. Kenyan growers sell more flowers directly to customers in countries like Russia, Japan and the US.

Many supply chain inefficiencies are the result of a lack of communication and coordination between key actors in the supply chain. The industry has developed generally accepted 'workarounds' to bypass recognised problems, such as flight delays and flowers arriving at the airport at excessive temperatures. Furthermore, in the flower supply chain, neglect by one player typically leads to costs for somebody else.

Flying flowers to Europe is more costly than shipping them by sea. If successfully developed, sea transport can make Kenyan growers more competitive and can improve profitability. Sea transport trials have been carried out, but are not yet commercialised.

Sector promotion

- **Country branding**
- **Export support**
- **Sector promotion**

The flower export industry is highly internationalised. Kenyan growers increasingly face strong international competition from other leading producer countries, like Colombia, Ethiopia and Ecuador, who are aggressively expanding their markets.

Colombia's Proexport is a good example of a public sector support organisation that contributes to the competiveness local export growers. Growers receive assistance in organising trade

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missions, but also through coordinated trade fair participations.

In all leading countries, private sector organisations are reasonably strong and active. They also enjoy a broad base among producers. Differences exist in the scope of services that these organisations provide. Some associations are very active in promotion, others more in aspects like advocacy, research, training, socio-environmental issues or logistics.

A real challenge and source of future success for Kenya lies in a co-ordinated approach to create national product recognition in foreign markets. What is needed is a more sustained joint approach to international promotion by sector associations KFC and FPEAK, with HCD and EPC support. Actually, to effectively promote the Kenyan flower brand, Kenya needs one face to the world.

Public sector coordination

- **Inconsistent taxes and levies**
- **VAT refund issue**
- **Fiscal incentives supporting innovative entrepreneurship**
- **Bureaucracy**
- **Coordination among public organisations**

Experience learns that the flower industry cannot be led by public initiatives alone. The primary role of the government should be facilitative and indirect (laws and regulation for foreign investment, intellectual property rights, technology transfer, air cargo licensing, foreign exchange transaction, etc.). Still, these are critical to the success of the sector.

Each country faces specific challenges that ask for targeted support and coordination. So is the case in Kenya. A specific issue in Kenya, for instance, is the decentralised system of taxation that often results in double taxation and inconsistencies.

The VAT rebate system is very inefficient and a burden to the industry. It is well known that nearly all produced flowers are exported, but at the same time, all growers must pay VAT on their input materials and afterwards submit a claim for a rebate, which usually is not paid back quickly enough.

We have seen that several other countries have put considerable efforts in reducing paperwork and bureaucratic overhead. Not only the environment for trade has been streamlined (by increasing the efficiency of customs), but also the tax system has become less complex.

A number of issues are often mentioned with respect to the various government bodies that are relevant to the flower industry. For instance, the costs (license fee, hiring experts, and required adjustments) and administrative burden related to the NEMA assessments are considered a burden for many growers. They, however, mostly complain about the costs related to required improvements, particularly expensive onsite water treatment plants. NEMA recognises this problem and in many cases a “negotiated compliance” is settled.

The sector would gain if government institutions would be more familiar with the characteristics of the entire flower value chain, understand the market, and know how it affects the local export industry. Public services should be more in line with needs of private sector.

Technology and innovation are ever more important playing cards in the international competitive game. Growers should be backed by government incentives and well-developed agricultural research and development systems all striving to strengthen the knowledge and efficiency in the sector.

Way forward

Kenya is in a good position to grow into its role as a leading global flower supplier... but market conditions are changing dramatically and the competition is moving fast.

A coordinated effort by both government and private entrepreneurs is necessary. Both sides will need to work passionately and determinedly together to strengthen Kenya’s competitive advantages and to create an enabling environment in which export growers and industry service providers can thrive.

With the strong and continued development of direct marketing lines, Nairobi has the opportunity to develop into an important trading centre.

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Post-Harvest Management in Commercial Flower Crops

Floriculture has emerged as a viable diversification option in the agri-business. It is a rapidly expanding dynamic industry recording a growth rate of more than 15 per cent per annum in the last two decades. Rapid urbanization, increased income levels and changes in social values resulted in increase of export market for cut flowers. Improvement in the general level of well being and increased affluence particularly among the middle class is also another reason for increase in the volume of local flower market.

The post-harvest behaviour of flowers is an outcome of the physiological processes, occurring in leaves, stem, flower bud, leafless peduncle or scape connecting bud to the stem. Some of these processes may act independently to affect the senescence and vase life of cut flowers but most of them are inter-related. The nature and extent of postharvest damage is typical for each crop or cultivar. The post harvest losses become important especially when dealing with the export of fresh flowers to distant and foreign market. Therefore, patient, soft and expert handling of flowers is of utmost importance after harvest.

The post-harvest quality of flowers depends upon mainly three factors.

1. **Pre harvest factors**
2. **Harvest factors**
3. **Post harvest factors**

Pre-Harvest Factors

Genetic Or Inherent Makeup

Postharvest lasting quality of flower species and cultivars vary considerably due to differences in their genetic make-up. Specialty flowers have a higher vase life compared to other flowers like rose,

Growing Conditions

Most cut flower crops require well-lighted conditions. On the contrary, too high light intensities cause scorching and dropping of leaves and abscission of petals. Flower crops are also specific in their temperature requirements. Optimum temperature and photoperiod, media qualities, etc differ from crop to crop. Flowers also require adequate nutrients for good longevity. High nitrogen doses should be avoided as they increase susceptibility to diseases. Flowers damaged by pathogens, insects and pests also show high ethylene production resulting in poor vase-life.

Harvest Factors

The most important factors for harvest are when, how and where—"when" the plant material will reach the optimum stage of development and "when" during the

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day to harvest. Each plant material has its own best harvest stage and this can vary depending on the use of, and market for, the crop. Flowers for preserving usually are harvested more mature than those for fresh, wholesale markets. The best time is the coolest part of the day and when there is no surface water from dew or rain on the plants.

Right stage, method and time of harvesting of flowers are of considerable importance to ensure their long vase-life. The stems should be cut with sharp knives or secateurs.

The flowers of rose, carnation, gladiolus, tuberose, daffodils, lily, iris, freesia and tulip should be harvested at bud stage since their buds continue to open in water. Harvesting of flowers at bud stage is always preferred as their buds have long vase-life, are less sensitive to ethylene, easy to handle during storage and transport and are less prone to diseases and pests.

Post Harvest Factors

Environment

The environment (temperature, relative humidity and gaseous composition) of the place where the flowers are handled is also crucial in determining the ultimate keeping quality of the flowers. At higher temperature, opening of flower buds and rate of senescence hastens. Cool chain should be maintained through-out. Cool chain includes the temperature regulation at all stages right from pre-cooling to final shipment. At low temperature, rate of respiration; ethylene production; transpiration rate; and micro-organism multiplication would be low/ minimum. Lower Humidity results in higher rate of transpiration. Exposure to air pollutants, ethylene from external sources (storage along with veg's/fruits) adversely affects the post-harvest life and quality of fresh flowers.

Water Relations

The termination of life of the harvested flowers depends on water uptake and transport, water loss and the capacity of the flower tissue to retain its water. A water deficit and wilting develop, when the transpiration exceeds absorption of water. The rate of water uptake of cut flowers depends on transpiration pull, temperature and composition of solutes.

Disruption of water columns in stem vessels by air embolism and resistance to water flow in stems, also develop water deficit. Acidification of water and addition of wetting agent and flower food in the holding solution markedly improve water uptake of cut flowers.

Respiration: The rate of respiration depends on quantity of carbohydrates available in the harvested flowers, temperature and the use of certain chemicals to regulate it. With higher temperature, there is faster rate of respiration and burning of the tissue. Consequently, the life of flowers is shortened.

Transpiration: Higher humidity in the air, less is the transpiration rate and vice-versa. Increased transpiration rate results in water stress and wilting of the flowers. Water deficit develops and wilting occurs when the transpiration exceeds water uptake/ absorption.

Post-harvest deterioration is a result of depletion of carbohydrates due to increased respiration rate, decline in membrane stability index (MSI) due to microorganisms, water stress and increased accumulation of ethylene. To Improve water relations of cut flowers, re-cutting the stems in water, quick hydration (conditioning), maintenance of Cool Chain should be practiced.

The method of handling as per the specific recommendations of respective flower is very important. Basic operations like pre-cooling, sorting & grading, pulsing, storage, packaging, transport, etc as per standard recommendations should be followed. Mechanical injuries (brusing, sorting & discarding of wilted flowers) should be minimized. Improper handling (bruising/injuries) – affects aesthetic appearance, facilitates infection by disease organisms through injured areas and also respiration and ethylene production higher in injured plant. produce which are estimated to be 30-40 per cent of farm value.

Post-Harvest Operations in Commercial Flower Crops

Precooling And Storage

Precooling is a treatment given to flowers to remove the field heat immediately after harvest. This is done either by forced air cooling or hydro-cooling to bring down temperature from 200-300C to 10C in a relatively short period. Other methods are room cooling and vacuum cooling. Flowers can be stored for a longer period at low temperature. There are two methods of cold storage-wet and dry. Wet method is short-term storage, in which cut stems are dipped in water. Dry storage is more labour-intensive method and costly. The controlled atmosphere based on reduction of respiration rates, conservation of respirable substrates during, storage, and delay in ethylene-triggered changes cause senescence. It involves the use of increased level of CO_2 and decreased levels of O_2 in the atmosphere, low storage temperature and prevention of the build-up of endogenous ethylene. Optimum storage temperature varies with the flower, rose, carnation, chrysanthemum, should be stored at low temperatures (0 – 10°C).

Conditioning/ Hardening

Restores the turgor of flowers wilted after harvest, storage or transport. Conditioning can be done with de-mineralized water supplemented with germicides and acidified with citric acid. Some wetting agents can be used for this purpose. Loading of flowers with high concentration of silver nitrate or nickel chloride of cobalt chloride for a short period of time is known as impregnation. It is helpful in reducing the attack of microbes and synthesis of ethylene.

Pulsing

Treating the flowers with high concentration of sucrose and germicide for a short period of time, in order to improve the shelf life and to promote flower opening. Pulsing is beneficial especially for flowers destined for long storage period or long distance transportation.

Bud Opening

Use of germicides, sucrose and hormonal solution to promote the opening of immature buds in crops like chrysanthemums, rose, carnation etc.

Grading, Bunching And Packaging

After harvesting the flowers should be graded according to various grades as per specification for local and distant market. Then these should be pulsed and made into bunches. Cut flower should be packed in corrugated cardboard boxed or sleeves. Packaging must ensure protection of flowers against physical damage.

Cold Storage

After pre-cooling and pulsing the flowers can be stored at low temperature. Controlled atmospheric (CA) modified atmospheric (MA) or hypobaric (LP) storage method can be used to enhance the post-harvest life of flower.

Packing And Transporting

Packaging ensures fresh flowers to the

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consumers. Lower rate of transpiration, respiration and cell division during transportation, are essential for long storage life and keeping quality. Before packing, flowers should be dried. Packing must ensure protection of flowers against physical damage, water loss and external conditions detrimental to transported flowers. Boxes made of corrugated fibre boards are good. Flowers sensitive to geotropic bending must be transported in an upright position. The flowers should be transported at an optimal low temperature. The relative humidity of the air during precooling and shipment of cut flowers should be maintained at the level of 95-98%. Lack of light during prolonged transportation particularly at high temperature causes yellowing of leaves in many flowers.

Shipment of flowers is usually done by truck, air and sea. For short distance and time period, cut flowers may be transported in insulated trucks without refrigeration after precooling and proper packing. Flower should be transported in corrugated cardboard boxes. The flowers which are sensitive to ethylene, ethylene scrubbers containing KMnO4 should be added to those boxes. Some of the flowers are sensitive to geotropic bending, so these should be transported in upright position. Some of the flower crops show yellowing during transportation due to lack of light, therefore there should be a provision of light inside the transporting vehicle.

Holding Solutions

After pulsing and storage, flowers are held in a solution containing sucrose, germicide ethylene inhibitor and growth regulator. It's basically aimed at providing nourishment to the cut flowers. The flowers can be kept in holding solution either at wholesaler, retailer or consumer level.

Use Of Preservatives/Post-Harvest Chemical Treatments

Preservatives in the form of tablets or powder are prepared from a mixture of chemicals-sugars, germicides, salts and growth regulators. Various types of conditioners are sugar and biocide, antiethylene compound, and hydrated compound. An ideal preservative solution consists of sucrose (respiratory substrate for providing nourishment), biocide/ germicide (aimed to kill the microorganisms including bacteria), acidifier (to bring-down the pH of the solution & to increase the uptake), anti-ethylene compounds (to minimize the damage from ethylene), etc. Optionally, growth regulators, mineral ions (which facilitates solution uptake), could be added in the solutions. Cytokinins delay senescence of some cut flowers. Depending upon the concentrations, GA in some cases promotes longevity of flowers, while this is also used in bud opening solution. The IAA promotes ethylene production of isolated carnation petals. Commercially ready to use preservatives are available. The flowers like gladiolus, carnation, chrysanthemum and freesia benefit most by the pretreatment. Antiethylene compounds in preservative solutions reduce the action of ambient ethylene as well as autocatalytic production of ethylene by fresh cut flowers. Greatest improvement in cut flower quality and longevity is obtained when DICA or DDMH were combined with sucrose.

Preservatives can be effectively used in various solutions used in different stages of post-harvest handling viz., pre-cooling (removal of field heat), conditioning (aimed at rehydration of the cut flowers), pulsing (loading of substrate), bud opening (opening of flower buds harvested in bud stage), holding/vase solutions (to hold flowers continuously till the termination of vase life).

Post-harvest chemical treatments with boric acid (2-5%) and packaging by keeping ice packs in alternate layers was found effective for loose flowers of jasmine and tuberose. Irrespective of the post-harvest handling followed, ageing and senescence is a continuous process and is characterized by loss of carbohydrates, loss of proteins, loss of phospholipids, decline in membrane stability index (MSI), production of reactvie oxygen species (ROS), transcription of new mRNAs, and de novo synthesis of new proteins (wastage of limited resources). Molecular Breeding for inhibition of ethylene bio-synthesis or genetic engineering at ethylene receptor level or by over expression of hormones like cytokinins would go a long way to significantly improve the keeping quality of flowers.

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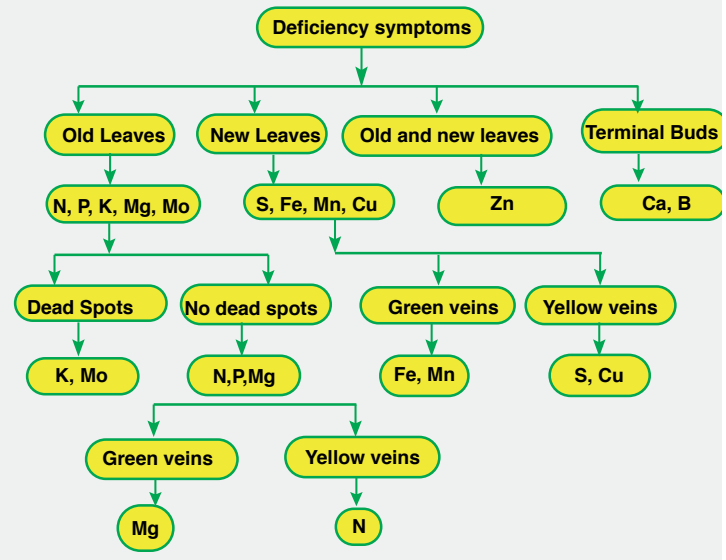
Nutritional Management in Cut Flowers

Floriculture sector is generating higher income and employment opportunities, promoting domestic market and exports. The traditional flower crops grown for loose flowers under open field conditions have different nutrient requirements compared to cut flower crops like roses which are grown under protected conditions. One of the factors affecting the productivity of most of the floricultural crops is due to improper use of nutrients. To improve the productivity, adequate amount of fertilisers in balanced proportion should be used.



Integrated Nutrient Management (INM) including use of mulches, organic manures and bio-fertilisers along with appropriate dosage of fertilisers is cost effective method to achieve more yield and better quality crop, besides, improving the soil fertility.

Application of appropriate plant nutrients at proper time with suitable method is one of the strategies to reduce various losses of nutrients which, in turn, increase the nutrient use efficiency. Deficiencies of nutrient elements cause various physiological disorders in flower crops and can be corrected by the application of appropriate nutrients.

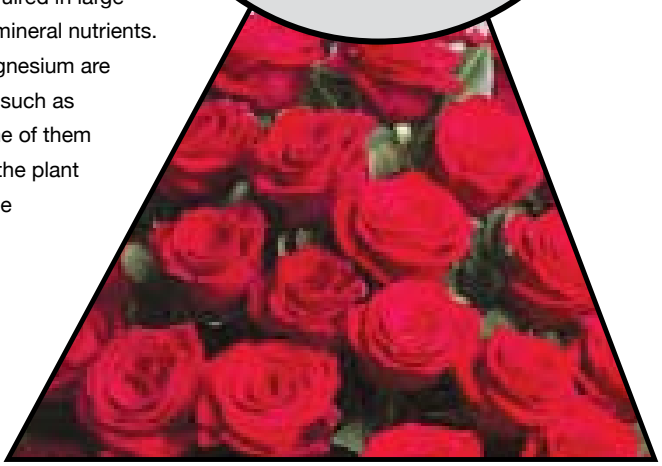
It is imperative to make a mention that the productivity of flower crops can be very low because of improper use of nutrients, unavailability of quality planting material, lack of adoption of proper planting methods and other agrotechniques. One of the means to improve the productivity is to use adequate amount of fertilisers in balanced proportion which may be very expensive but must be given more attention by the flower growers or floriculturist. The available information regarding proper use of fertilisers is very much scattered in flower crops in particular.

It is well known fact that balanced nutrition is essential for the growth, development and flowering of crops. All the elements play important role both in the vegetative and reproductive growth and are indispensable for production of foliage and flowers. As nitrogen, phosphorus and potassium are required in large quantities and hence, affect plant growth more as compared to other mineral nutrients. In addition to these, secondary nutrients like calcium, sulphur and magnesium are also needed in fairly large quantities than the other essential elements such as iron, manganese, zinc, copper, boron, molybdenum and chlorine. Some of them e.g., nitrogen, phosphorous and sulphur are consumed in building up the plant architecture while calcium, potassium and magnesium have both tissue building and metabolic functions. However, other essential elements such as boron, iron, manganese, copper, zinc and molybdenum have metabolic functions in the plant life.

In general, the micro-nutrients are found naturally in the soil in

To Page 20

Farm trials conducted should result in various fertiliser recommendations in commercial flower crops. The review on nutrition related aspects on flower crops revealed that split doses of nutrients are superior to single application.



Nutritional deficiency disorders in Roses			
Crop	**Nutritional Deficiency**	**Symptoms**	**Management**
Rose	Iron	• Slow growth and wilting of plants • Interveinal chlorosis in young leaves • Thin leaves and stunted growth • Necrosis at leaf margins • Dull flower colour and small size • Aborted flowering shoot	• Soil should be slightly acidic (pH 6 to 6.5). • Use N fertilisers with higher NO_4 /NO_3 ratio. • Avoid calcareous soil and bicarbonate rich irrigation water. • Spray 0.5 % $FeSO_4$ at pH 4- 5 with surfactant Fe- EDTA chelate at 0.1 %.
	Boron	• Malformed flower buds and petals • Decrease in flowers • Die back of stem tip and flowering shoots • stunted root growth • Scorched, thicken, cup shapes and distorted leaves • Shoot become stiff and excessively branched	• Foliar spray of 0.2 % Boric acid twice at 30 and 45 days after pruning.
	Magnesium	• Large necrotic white areas located symmetrically on both sides of midribs of leaflets between larger veins • Young leaves become mottled and Chlorotic • Immediate drop of injured leaves • Severe root injury	• Adding Magnesium Sulphate at 15-25 g/ plant immediately after pruning.

From Page 19

sufficient quantities, whereas the macro-nutrients are deficient in the soil and needs continuous supply. The availability of these nutrients in soil depends upon the soil pH. Iron, zinc, manganese, aluminum and copper are available at low pH (5.0 – 7.0), whereas the availability of boron decreases at < 5 and > 7 pH. However, availability of molybdenum is maximum at pH6.5. Chelated compounds are used to increase the availability of micronutrients and make them available to the plants. Recommended manures and fertilisers are conventionally applied to the soil either as basal dose or top dressing. However, foliar nutrition is an effective method of applying nutrients for better production in floral crops. The metabolic function of all the elements required for the plant growth and development are well described.

Nutrient Deficiencies and Disorders in Flower Crops

Deficiency leads to morphological variation, which results in low productivity of quality flowers. The deficiency symptoms of nutrients can be corrected through foliar feeding. The easy key for identification of deficiencies of macro and micro nutrients in general is summarised in Nutritional disorders are basically physiological disorders in the plants that affect the productivity as well as the quality of flowers. Disturbance in the plant metabolic activities resulting from an excess or deficit of environmental variables like temperature, light, aeration and nutritional imbalances result in disorders. Nutritional disorders have become widespread with diminishing use of organic manures, unbalanced NPK fertiliser application and extension of horticulture to marginal lands.

Therefore, proper application of nutrients/ fertiliser is important to prevent the crop from these disorders. Various disorders of flower crops and their symptoms is given.

Fertilisers play an important role in increasing growth and flower yield. Organic manures play a vital role as a component of integrated nutrient management in achieving higher crop yields and soil health for sustainability. Application of appropriate plant nutrients at proper time with suitable method is one of the strategies to reduce various losses of nutrients, which in turn, increase the nutrient use efficiency. Nutrients along with bio-fertilisers are beneficial for enhancing quality and yield in flower crops.

Table 2 – Elements, concentration and their role in plant metabolism

Elements	Quantity in whole plants	Function
Carbon	45%	All cellular constituents
Oxygen	43%	All cellular constituents
Hydrogen	6%	All cellular constituents
Nitrogen	3-5%	All living matter, amino acids, proteins
Potassium	1.5-3%	Enzyme system in the change of sugar to starch, citric acid synthesis, in the change of amino acids to proteins, respiration, interaction with iron enzymes, photosynthesis, buffer
Calcium	0.1-3.5%	Cell wall, cell permeability, buffer
Sulphur	0.05-1.5%	All living matter, proteins, nodulations in legumes, allyl oils of mustards, chlorophyll synthesis
Phosphorous	0.25-0.5%	All living matter, nucleo proteins, lipids, phosphorylation enzymes
Magnesium	0.05-0.7%	A part of the chlorophyll molecule, enzyme activator of hexokinase, phosphorylase, carboxylase, dehydrogenase, peptidase, photosynthesis, buffer
Chlorine	100-300 ppm	With Na and K it helps in maintaining cation anion balance
Iron	10-1500 ppm	A part of the porphyrin compounds cytochrome enzyme system, chlorophyll synthesis
Manganese	5-1500 ppm	Chlorophyll synthesis, stabilisation of H- atoms split from H-OH by hydrogenation in photosynthesis, reduction of nitrates to nitrites, activator of arginase, carboxylases and dehydrogenases
Zinc	3-150 ppm	Tryptophan synthesis, phosphorylation enzymes, enzymes in chloroplasts
Copper	2-75 ppm	Enzyme in synthesis of ascorbic acid, activator of polyphenoloxidase, lactase and oxidase
Boron	2-75 ppm	phosphorylation enzymes, glutamine synthesis, nodulation in legumes
Molybdenum	Very less	Nodulation in legumes, tannin synthesis, reduction of nitrates to nitrites

Application

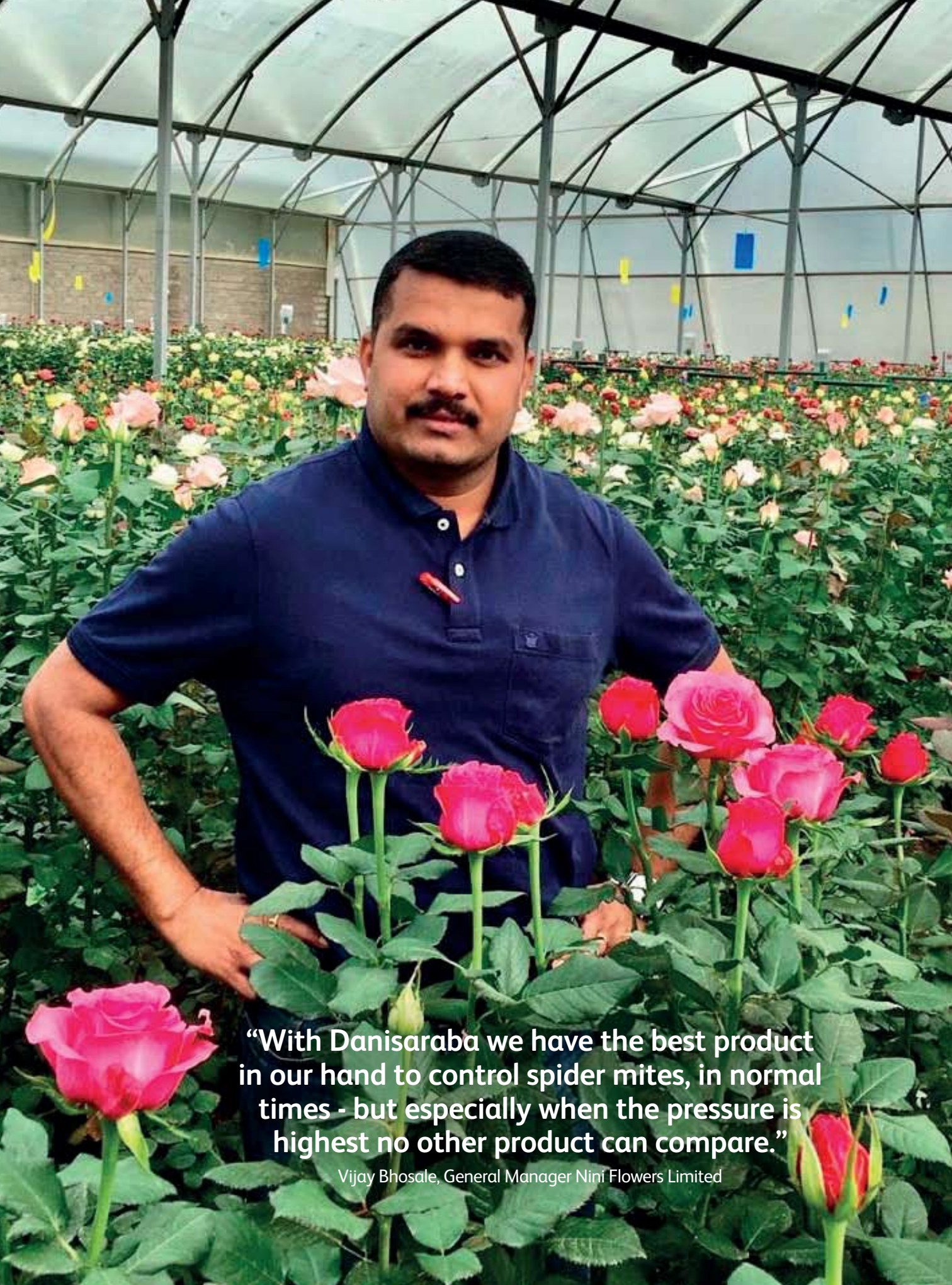
Both organic and fertilisations have beneficial effects on growth, development and flower production. The review on nutrition related work during last three decades indicate the significance of developing various technologies for increasing quality flower production. Each of the mineral elements is specific in its functions in plant metabolism. In order to maintain proper health and sustain production of roses, it is essential to apply the accurate fertiliser at correct time in appropriate amounts. The nutritional requirement varies with cultivars, soil type and its fertility status.

Nitrogenous fertilisers are more important in vegetative growth and phosphates help in production of more and good quality blooms. Although some soils are quite rich in potassium, the potash fertilisers in combination with others give good results. Balanced feeding with nitrogen and phosphorous impart vigour to the plant, enhance flower yield and quality. The optimum dose of nitrogen and potassium and right amount of phosphorous provides a better vegetative growth with higher yield.

It is well known that nearly 60-70 per cent N of total nitrogenous fertiliser is lost during transformation of ammonical form of nitrogen to nitrate form. For increasing fertiliser, nitrogen use efficiency, there is a need to limit the rate of ammonium oxidation.

Although a number of nitrification inhibitors are available nowadays, but all of them have limitations in their usefulness in one or other way. Application of nitrogen along with encapsulated calcium carbide (CaC2), a nitrogen inhibitor, result in better utilisation of applied N by the rose plant and also markedly affect flowering, flower quality and flower yield.

The secondary nutrients also play an important role for the improvement in production of quality rose flowers. It is observed that, the soil application of calcium, magnesium and sulphur appreciably affect the vegetative growth of roses. Magnesium increases the stem length, bud size, flower diameter and number of petals per flower. Magnesium and calcium applications increase the longevity of intact flowers. Application of fertilisers in solution form to the soil or hydroponics or in fertigation is practiced for obtaining good exhibition blooms. The advantage of this method is that nutrients solution reaches the plant root for immediate utilization. Foliar application of nutrients not only rectifies the nutrient deficiency but also increase the flower production.



“With Danisaraba we have the best product in our hand to control spider mites, in normal times - but especially when the pressure is highest no other product can compare.”

Vijay Bhosale, General Manager Nini Flowers Limited

SAY 'GOODBYE' TO MITES WITH DANISARABA®.

Spider mites are an economically important plant feeding pest in the horticulture industry. They cause damage by sucking sap from the leaves and severe infestation may render the crops unsellable.

Spider mites are members of the Acari (Mites) family Tetranychidae that are mostly found living on the undersides of plant leaves. They are small pest of less than 1mm in size with one female capable of laying up to 20 eggs a day and can live for 2-4 weeks laying hundreds of eggs. There are about 1200 species of Spider mites with the two spotted red spider mite (Tetranychus urticae) being the most common in ornamental plants.

Life cycle

The life cycle of Spider mites is influenced by climate with hot and dry conditions being favourable for reproduction and development. The rate of Mites production accelerates at optimum temperatures and as a result allows them to become quickly resistant to pesticides.

Temperature	No. of days to complete life cycle
20°C	17 days
25°C	14 days
30°C	7 days

Table 1: Effects of temperature on life cycle of Spider Mites.

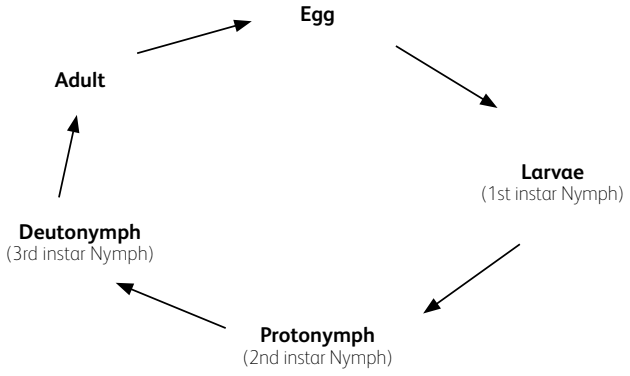


Figure 1: Life cycle of a mite.

Several methods of managing the pest are available to the grower. Cultural, Biological and Chemical control are the methods used to manage the pest. Use of predatory mites such as Phytoseiulus persimilis and Neoseiulus californicus has become common with many growers. As such, when choosing a Miticide to spray, it is always important to consider compatibility. Cyflumetofen, the active ingredient in Danisaraba® is a novel acaricide developed by OAT agrio Co ltd. The mode of action of Cyflumetofen is by inhibiting mitochondria complex II electron transport.

Why Danisaraba®?

- Effective on all life stages of mites.
- Effective solution against Tetranychus spp, Panonychus spp and Oligonychus spp.
- Important tool for IPM program - It is highly compatible with beneficial insects, natural enemies and predatory mites - which are important tools in IPM programs.
- New mode of action - Useful as a resistance management tool.
- Quick knock down with long residue effect.
- Environmental friendly.

Please order Danisaraba via your sales managers from Elgon or Chrysal. For more info on our services and products, please contact us at: info@chrysal.co.ke

Scan to see our Danisaraba movie.

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TRANSFORMING FARMS & LIVES THROUGH TECHNOLOGY

CHRYSAL

New in the FSI Basket: Environmental criteria

Starting 1 January 2021, the FSI Basket of standards has a third scope. The GAP and Social scopes are complemented with an Environmental scope. With IPM and reliable record keeping at the centre, this new scope will offer growers and their supply chain partners capacity to keep the sector future-proof.

It has become evident that reliable record keeping is essential to measure and demonstrate sustainable progress and positive impacts. As new tools like environmental impact indicators and footprints become more widely used, such as the one being developed by FSI, there is urgency to put record keeping in the scope of the FSI Basket. This will offer producers more opportunities to keep their toolbox full, and to proactively demonstrate and discuss with NGO's, legislators and customers, while remaining the owner of their data.

FSI has been actively promoting this development towards certification schemes, who were invited to adopt or modify their record keeping criteria in line with the FSI benchmarking requirements and encouraged to tailor their services to their client base in the best way possible.

Several standards have been successfully benchmarked and compliant with the FSI Environmental benchmark criteria. Kenya Flower Council Silver Standard, Florverde® Sustainable Flowers Standard and MPS-ABC/GAP/SQ are the first standards to be included to the Environmental scope of the FSI Basket. Other floriculture schemes are currently being reviewed for benchmarking and we expect some of them to be recognised and communicated as compliant soon.

FSI members of trade and retail are actively asking for products that comply with the FSI Basket given that they are starting to report on all 3 scopes of the FSI basket of Standards. As such, certified growers are directly rewarded by being actively bought, promoted and recognised as responsible sources on the auction clocks and in various web-shops.

Measuring 2020

This year, FSI members of Trade and Retail are reporting for the 6th time on their volumes of responsible flowers and plants, using their 2020 data against the FSI Basket of standards.

Members of production are sharing their certification status with the FSI Secretariat and are included in the reporting as well. Based on some preliminary results we see again an increase in the percentage sustainably produced and traded flowers and plants!

FSI members are regularly meeting to evaluate progress and discuss issues they are facing, as well as solutions to continue stimulate responsible production and sourcing. As of next year, as part of the FSI2025 ambition, they will start a more stringent reporting process including the Environmental scope (see above) and with individual action plans and accountability towards the 90% target.

Kenya Flower Council Applies
for third-party social compliance programmes

The Consumer Goods Forum's (CGF) Sustainable Supply Chain Initiative (SSCI) has received a benchmarking application from the Kenya Flower Council (KFC), the programme's first step in earning SSCI recognition as meeting industry expectations for third-party social compliance programmes under the SSCI's Primary Production scope. KFC is the first scheme to apply under this new scope, which was launched in May 2021.

The SSCI is committed to building trust in sustainability standards by recognising programmes that respect key sustainability criteria, as defined by leading industry stakeholders, in their evaluation methods.

Kenya Flower Council (KFC) is the country's leading Business Membership Association for growers and exporters of cut-flower and ornamentals. KFC also owns the Flowers and Ornamentals Sustainability Standards (FOSS), a trusted standard worldwide. The Council is in the forefront promoting Kenya as a reliable source of quality cut flowers and ornamentals and the country's competitiveness in the global floriculture trade. KFC is actively engaged in all major trade negotiations in existing, new and emerging markets and in amplifying Kenya's image in the international market as the most trusted source of cut flowers and ornamentals. Additionally, KFC engages with key actors locally for a favourable business environment for growers and exporters of cut flowers and ornamentals.

Clement Tulezi, Chief Executive Officer, Kenya Flower Council, said, "KFC is fully committed to apply and comply with the Certification Scheme Quality System Regulations; based on ISO/IEC 17065, Conformity assessment – requirements for Bodies Certifying Products, processes and services covering the production and export processes of flowers and ornamentals; and its implementation ensures that audits and the entire certification process are carried out with impartiality, objectivity, confidentiality, and efficiently. Application of the Quality System also ensures that only deserving producers are awarded the certificates applied for. We are devoted to providing continued improvement in service delivery to registered producers."

The SSCI Benchmark is a comprehensive process that recognises which schemes cover key sustainability criteria and apply relevant verification practices. The process revolves around a first self-assessment undertaken by the scheme, followed by a review by an independent expert, office visits, and a public consultation. The methodology also includes opportunities for the applicant to take corrective actions if and when needed.

The SSCI Benchmark is based on the SSCI Social and Scheme Management Criteria, which cover the industry's expectations for sustainability and were defined by the SSCI Coalition member companies, industry experts, and other stakeholders. Following the launch of the SSCI's Manufacturing and Processing scope in 2019, the SSCI opened the SSCI Benchmark to the agriculture, aquaculture, and seafood sectors with the publication of Social and Scheme Management Criteria adapted for its new Primary Production and At-Sea Operations scopes. This work was developed in collaboration with the Global Sustainable Seafood Initiative (GSSI).

Mr. Clement Tulezi, CEO, KFC

At the SSCI, we welcome this positive step from KFC and look forward to reviewing its alignment towards industry values on transparency, social responsibility and sustainability. To monitor the process of its evaluation, and other schemes undergoing the benchmarking, visit www.recognition.tcgfssci.com.

FSI is developing a footprint calculation tool

FSI members are well aware of the climate/environmental urgency and together they pledged to contribute to lower the sector's carbon footprint towards 2025. As a first step, they collectively decided to develop an environmental footprint tool, with the support of BLONK Consultants and drawing from the experience in the IDH Fruit & Vegetable program, SIFAV.

Currently a beta-version of the tool is being tested by some FSI members active in the supply chains of Roses, Chrysanthemum and Phalaenopsis, the three prioritised products for which a carbon reduction objective will be set towards 2025, in line with the Paris Agreement. Their feedback will help finalize the tool which will be available to all FSI members in September 2021. The tool will be assisting FSI members in selecting the relevant datapoints and calculating their respective footprint. The calculations done will be aligned with the EU FloriPEF methodology, assuring a harmonized set of rules so that outcomes of various tools and implementers can be compared and validated.

Global Floriculture Industry Statistics & Trends

Like many industries, floristry and floriculture are rapidly evolving as technology and farming practices further evolve in the 21st Century. Below are key floristry and floriculture industry statistics and trends highlighting the shifts in production, employment, consumer sentiment, and floristry practices globally. In addition, the impact of Covid-19 will present numerous short term and long-term challenges to the industry as a whole.

Global Floriculture Production Statistics:

- The worldwide market for Flower and Ornamental Plants (those that are grown for the primary purpose of being solid as cut flowers, houseplants and in landscape design) is expected to grow roughly 6.3% over the next five years, reaching $57.4 Billion USD in 2024, up from $42.4 Billion USD in 2019

- As of 2019, the Netherlands retains a key role in the global trade of cut flowers accounting for over 40% of all global export volume.

- As of 2019, Kenya has grown to become the world's 3rd largest exporter of fresh cut-flowers supplying close to 40% of all flower sales today in Europe.

Which Countries are the Biggest Producers of cut flowers?

- Over the past 20 years, the production of cut flowers has grown at a median annual rate of 7.5%.

The Top 10 Producing Countries in the World (as of 2018) by Volume of Cut Flowers Grown:

Position:	Country:	% Of Global Production:
(1)	The Netherlands	52%
(2)	Columbia	15%
(3)	Ecuador	9%
(4)	Kenya	7%
(5)	Belgium	3%
(6)	Ethiopia	2%
(7)	Malaysia	1%
(8)	Italy	1%
(9)	Germany	1%
(10)	Israel	1%

The Top 5 Countries by Export Revenues in 2019:

Position:	Country:	Export Revenues (Us $):	% Share
(1)	Netherlands	$4.6 billion	48.9%
(2)	Columbia	$1.4 billion	14.9%
(3)	Ecuador	$879.8 million	9.3%
(4)	Kenya	$709.4 million	7.5%
(5)	Ethiopia	$241.3 million	2.6%

Which Countries are the Biggest Producers of Specific Flower Varieties?

Roses: Ecuador is the largest producer of Roses in the world.

Tulips: The Netherlands produces 80% of the world's tulips.

Carnations: Colombia produces the most Carnations.

Orchids: Thailand is the biggest producer of Orchids.

Peonies: The Netherlands is the largest producer

Waste in flower production:

- 45% of the flowers managed by the floral industry die before they are even sold.

Consumer Spending by Floral Events and Occasions

- United States $1.83 Billion
- Germany $1.28 Billion
- United Kingdom $921 Million
- Russia $554 Million

• The biggest floral event of the year is Valentine's Day followed by Christmas and Hannukah and then Mother's Day. Combined they account for over 70% of annual revenues recorded by most floristry businesses.

• 77% of flower purchases involve a specific occasion or reason. Birthdays and Anniversaries account for 24% of annual sales.

• 60% of all flowers and plants sold globally are purchased as a gift for someone else. 20% are purchases for weddings or funerals and approximately 20% are purchased for the home or office.

• The Rose is far and away the most popular flower. It serves as a timeless symbol of love and romance throughout the year in addition to serving as a filler or compliment in mixed-stem arrangements for numerous gifting occasions.

Implications of COVID-19 on the Floriculture and Floristry Industry:

• A 6.2% contraction was expected in 2020, as a result of a steady decline being amplified by an economic slowdown as the result of the COVID-19 pandemic.

Vacciplant:
Innovative Fungicide Against Powdery Mildew

UPL Ltd has continued to deliver successful product innovations. This time they organised a very successful virtual training on Vacciplant, an innovative Biofungicide against powdery mildew in Ornamental crops and Snowpeas. Timely and almost audio-recorded voice of Lara Ramaekers, a UPL Biosolutions Specialist, greeted the air as she took growers through the innovation.

Speaking to the growers Lara asked, "Have you ever thought of protection against powdery mildew without residue?" Adding, "We are discussing the newest technologies in protection against powdery mildew and other causal pathogens. It allows the grower to reduce the number of active ingredients used, achieve better

Key Benefits

Through the Vaccine action, Vacciplant prompts the plant to fight against the diseases. The product is better used preventively. Lara told the growers that the product has control of various fungal and bacterial diseases with zero residue (0 days PHI). The product poses minimal risk of development of resistance. She confirmed that the product is compatible with both conventional and other biological products. It has no harm to any beneficial organisms and has a unique mode of action. (FRAC Group P4). The product has been approved for organic farming by Ecocert. Vacciplant is also a great tool for successful Integrated Pest Management programs. It is one of the best alternatives for the most demanding food chains and organic growers. It is a complimentary solution to conventional plant protection products.

Use of Vacciplant

Growers were advised to use Vacciplant before appearance of disease symptoms. It can be used to reduce the number of conventional fungicides when disease pressure is low to medium. Growers can break resistance to chemical fungicides by using Vacciplant in a program. In case of high disease pressure, growers are advised to tank-mix with conventional fungicides to boost disease control or do a clean-up first with the highly curative fungicides.

Estelle Moreau, Technical Manager Biofungicides Global R&D

Vacciplant

Speaking to the growers, Estelle Moreau, UPL Global Technical Lead Biofungicides said, "Vacciplant 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

As an eye opener to the new molecule, Estelle said, "all living organisms, plants have evolved a wide range of mechanisms to defend themselves against diseases

Lara Ramaekers: Global Marketing & Alliance Manager, Biofungicides

and pests. Systemic Acquired Resistance (SAR) is a form of induced resistance that is activated throughout a plant after being exposed to elicitors from virulent, avirulent, non-pathogenic microbes or artificial chemical stimuli. Induction of SAR is characterised by the accumulation of salicylic acid to stimulate defence mechanism. It can take several days for SAR to develop throughout the host plant. Laminarin triggers plant defense response in three main ways namely;

1. Reinforcement of the cell walls
2. Production of phytoalexins
3. Production of PR proteins.

Resistance and Residue Management
Estelle presented numerous trials of Vacciplant in comparison to other products in use. She said, “Laminarin acts on various pathways through the plant and not directly on the pathogen, it doesn’t add selective pressure on the pathogen strains and probability of resistance appearing is greatly reduced. Consequently, there is a very low risk that using Laminarin selects pathogen strains resistant to the plant defense mechanisms”.

She informed growers that including Vacciplant in their programs reduces the active ingredients from chemical fungicides and maintains the yield compared to full conventional fungicide programs.

Field Trials

Ms. Hannah Kibiru, Product Development Specialist, Arysta LifeScience 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 a preventative for three consecutive applications at 7-10 days interval. Vacciplant is safe to a wide range of beneficial insects and predatory mites.

Grower’s Testimony

Vacciplant launched in Kenya in 2019 has been used by numerous farmers. Mr. Fred Okinda of Deruiters explained to fellow growers why they should have Vacciplant in their spray programs.

“Vacciplant works as an elicitor, it triggers a plants own natural defence against harmful pathogens, with a long elicitation ability of upto 21 days in a plant”, he said.

1. It is a good system in the attempt to reduce agrobacteria infections which is a major problem in the rose industry.

2. Breaks down resistance to major fungicides. Fits in fungicide resistance management

3. Reduces number of active ingredients per season due to its long persistence

4. Does not have residue and has a short re –entry interval that allows crop husbandry practices to be done in a timely fashion. Compatible with IPM unlike Sulphur that is not friendly to some beneficials.

5. Being a seaweed, it is friendly to the environment, and also the health and safety of sprayers is guaranteed.

6. Eliminates the blackening and thinking about chemical residues on the product.

7. It has suppressive effect on downy mildew and botrytis.

Growers’ Comments

Other growers who spoke during the virtual meeting 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. They 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.

Global usages of Vacciplant

Across the globe, Vacciplant was reported to control a wide spectrum on fungal and bacterial diseases including;

1. Powdery mildew on vines, vegetables and berries.

2. Botrytis on vegetables and berries

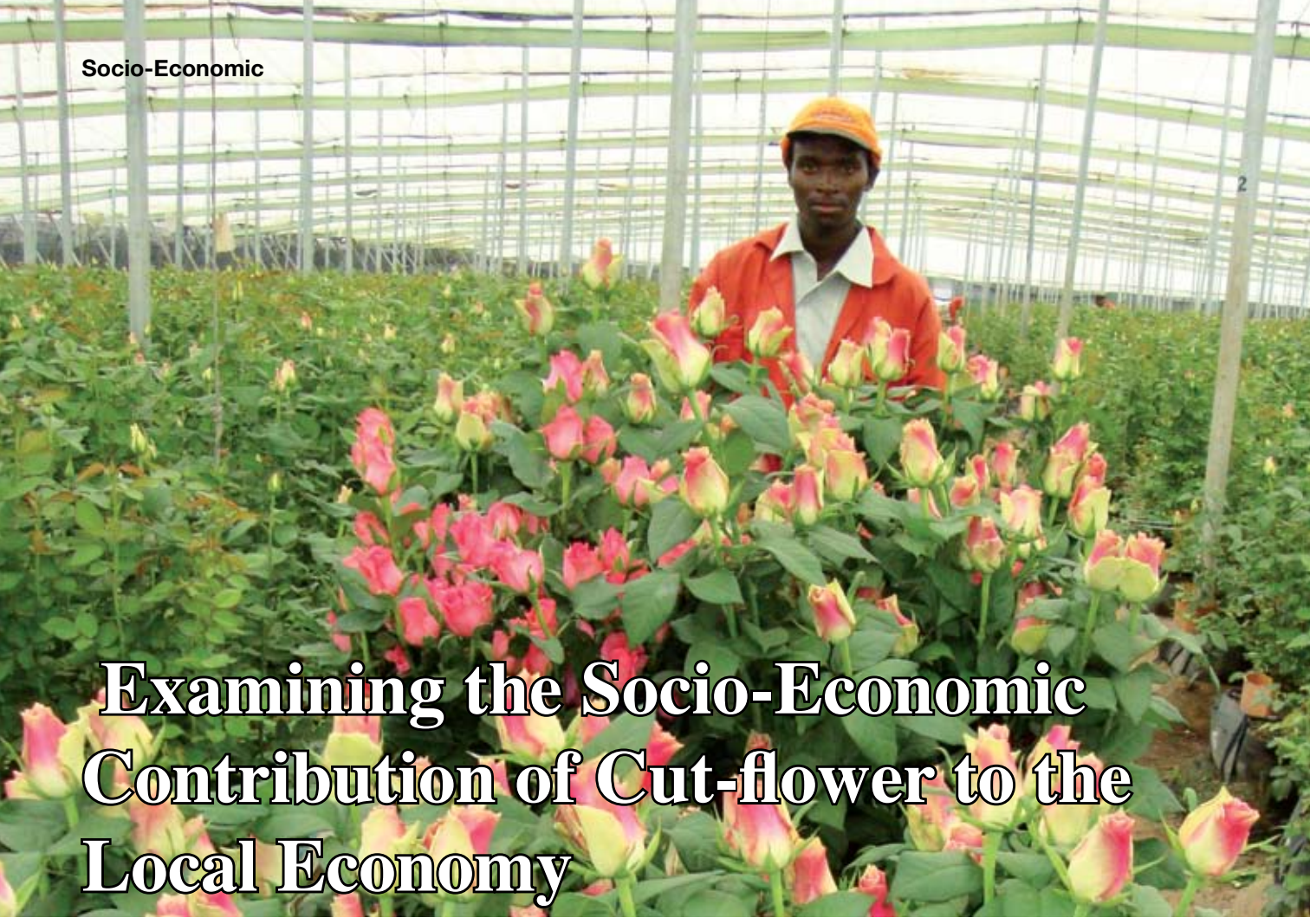
3. Bacterial diseases on several crops

4. Downy mildew on lettuce and cucurbits.

There is ongoing research to further identify the potential of Vacciplant. Trials are also ongoing in Kenya and the label will be extended once registration is acquired.

Attendance

The successful zoom was well co-ordinated by Mr. Innocent Arunda. He was backed by other technical, sales and management team from UPL. In attendance were over 80 growers from all over the country and the neighbouring Ethiopia. Representatives from their key distributors also attended.



Examining the Socio-Economic Contribution of Cut-flower to the Local Economy

Kenya is striving to be an upper middle-income economy with an annual 10% growth while implementing the three pillars among them the economic pillar. Agriculture sector has been the country's main economic stay, which is generating income to the country as well employing many citizens. The contribution of the cut-flower sector into the country is enormous and is key in driving Kenya's economic growth. The flower farming in Naivasha basin covering approximately 1200 ha accounts for 40% of Kenya's cut-flower exports and generate approximately 8% of the country's foreign exchange revenue. The cut-flower sector is thus a huge opportunity for the country both national and county government of Nakuru to turn around the local economy through investing in the sector adequately and protecting related resources like L. Naivasha.

Challenges facing the cut-flower industry

Increases in freight cost and potential discontent from potential customers pose challenges to the sector. Other challenges are that, the staff turnover with most workers being women is poor, harvesting a lot during given period might lead to dry-up and loss due to inadequate storage facilities, buyers demanding more flowers than it is readily available and poor remuneration and working conditions of workers.

Also in Lake Naivasha basin for example which accounts for 40% of Kenya's cut-flower, Karagita area cost of living tend to be high, coupled with poor houses and sanitation. Workers receive an average pay with the trade unions continuously carrying out their role of safeguarding worker's welfare in the cut-flower industry in Kenya. However the basin include an economy of a broad group of stakeholders like large horticulture companies and their employees, the out growers and small holders, local government and basin inhabitants supporting a local economy of almost 650,000 people. The contribution of floriculture to the L. Naivasha local economy is approximately $ 180 million annually

Cut-flower contribution

Cut-flower farming is providing employment to the locals. The proceeds from the flower firms have become a great income earner for them and that they are getting empowered socio-economically. In terms of poverty reduction which is one of the components of Kenya's Vision 2030 under economic pillar, floriculture practices are

Cut-flower farming is providing employment to the locals. The proceeds from the flower firms have become a great income earner for them and that they were getting empowered socio-economically. In terms of poverty reduction which is one of the components of Kenya's Vision 2030 under economic pillar, floriculture practices are ameliorating them from poverty.

ameliorating them from poverty. Cut-flower farming is the biggest contributor to physical development in Naivasha Sub-county, that is, education infrastructure, water supply, roads construction, energy, health facilities among other sectors. However, just like many others flower firm workers are not living in good housing conditions despite them having secured jobs from the flower firms.

Social challenges facing cut-flower industry

Flower farm workers get wages where majority of them are casuals. The workers report a few cases of experienced health risks due to the chemicals used in flower farms like the pesticides. Most of these cases are human error. The majority of the workers in flower farms are women and they report declining sexual harassment compared to the past. A minority said that there was no freedom of expression since workers fear intimidation and dismissal from work.

Environmental Challenges

Majority of the area residents noted that pollution of Lake Naivasha is the main challenge facing the basin. Chemicals from flower farms are being swept into the Lake which was posing a threat to the lives of the people depending on the lake for livelihood especially the fishing industry. There was unsustainable use of the water from the Lake Naivasha to perform the flower farm activities.

The contribution of cut flower

All said and considering the above, we can say despite the few challenges which are more individual than industrial, the flower sector is doing relatively well and needs support from all.

Cut flower industry supports Kenya making it the top leading African economy providing source of income to many citizens. Economic indicators too are showing a steady rise in the significance of the flower industry to the Kenyan economy with the share of export volumes and value of fruits, nuts and cut-flowers increased. Kenya is to become an upper middle income economy by 2030 and is implementing Vision 2030 through its medium Term Plans and Agriculture is one of the sectors under the economic pillar that is supposed to drive the economy growth by 10%.

Flowers are thought to positively affect the mental state of some people while ornamental flowers are an economic sense in that overally across the world the cut-flower industry is worth $ 40 billion annually benefitting indirectly retailers and other businesses to woo potential customers. The sector has challenges that is bedeviling but they are manageable and most farms have been able to manage them.

Mr. Robert Kisyula, former CEC Agriculture

Hope for mango farmers as exports to Europe resume

Makueni is the leading county in mango production contributing up to 31 per cent of the total fruits that Kenya produces. “Right now the amount exported is two per cent of the total production of 184,000 tonnes produced annually, which is a small fraction,” said Robert Kisyula, the then CEC Agriculture, Makueni.

That mangoes are critical to the economy of Makueni County, is not in doubt. What is worrying is that the devolved unit only exports a paltry two per cent to the world market, missing out on lucrative global business.

Part of the reason for a slow uptake on the export market was because of a self-imposed ban by Kenya in 2010 after experiencing a bout of mango fruit fly that risked Kenya’s produce being banned in Europe, which is its main market before the moratorium. “It was easier to pull out ourselves than being banned by markets in Europe. We hope that we will be able to reopen the EU market this year,” he said

The ban had a serious impact on the price of mangoes locally with a kilo going for as low as Sh5 with disgruntled farmers failing to take their crop to the market, leading to post-harvest losses.

Value-Addition

It is because of this that the county opened up Makueni Fruit Processing Plant, which at the moment buys fruits from farmers at a good price and doing value-addition for both the local and export market.

The plant has been registered as an export zone allowing the produce that comes from the facility to be exported to the world market.

"We have the capacity to triple mangoes that goes to the export market, and we are hoping that in two years we will be at 10 per cent of mangoes produced getting to the international market," he said.

The factory processes mango puree and they are extending it to cater to other produce in the county such as tomato concentrate and banana pulp. The products from the firm are sold locally as well as in the international market as a concentrate for making juice and other beverages.

The plant aims to process mangoes from other regions in future as the Makueni crop alone is not enough to meet the required quantities. "It was targeting 900,000 tonnes this season for processing but it only got 400,000 from local farmers," he said.

Julius Ngwasu, who is a vice-chairman of local cooperative society with more than 400 members, says the factory came as a relief to most of them because it has waded off the cartels who used to offer them rock bottom price.

The factory has come at a good time, it has helped us to get good prices as initially, middlemen used to manipulate prices. Now we are able to sell bigger percentages at the factory plant through the cooperatives," he said.

The farmer said they are now earning up to Sh20 per kilo, which translates to about two big fruits as opposed to Sh5 for the same quantity from brokers previously.

The county has 12 fruit cooperative societies that have formed Mafruits, an organisation bringing together all mango producers with a current membership of more than 17,000 growers.

"One of the biggest gains to a local farmer as a result of this plant is that there have been no cases of price exploitation," said Mr Kisyula, the then CEC.

Fruit flies, which are quarantine pests in Europe, have been a major impediment towards exporting mangoes to the European market.

Kenya has been exporting mangoes to middle-eastern nations after it paused the European market but the returns have been low compared with what farmers would earn from the EU bloc.

According to the county, farmers have been making losses of between 40 per cent and 50 per cent as a result of the fruit flies. The county intervened through the provision of the fly traps to contain the huge losses as well as target the resumption of the lucrative European market.

"With the installation of fly traps, we have been able to half that loss to 20 per cent, hoping to cut further to 10 per cent, which is our target as we might not eliminate everything," said the county official.

Mr Ngwasu said he has been able to contain the number of fruit flies on his farm and has been making a profit since he started using the traps. "At the moment I have 108 mango trees in my two-acre land, in the last season, I lost almost everything to fruit flies, but since I got the traps, my gains will be huge," he said. Mutheu Kithuma, a director at Kibwezi Agro Limited, says they are keenly waiting for the resumption of the European market in the coming months, most probably in September.

Major boost

She said the European market would come as a major boost to her and other farmers, given that the earnings from Europe are 20 per cent more than what they get from Dubai, Saudi Arabia, Qatar and other middle-east countries.

Ms Kithuma has 10,000 mango trees on her 180-acre farm, making it one of the largest orchards in Kenya, with the plans underway to expand it to more than 20,000 trees.

The Directorate of Horticulture says Kenya is ready to resume exports because of the suppression of fruit flies.

Wilfred Yako, assistant director of regulations and compliance at the directorate, said Kenya is now set to return to the EU market, following the initiatives that have been put in place.

"Since 2020 to date, it has been established that the level of infestation have drastically gone down and this gives assurance that farmers will now access the EU market," he said.

> "The move to resume exports to the EU has been enabled by the creation of pest-free areas that would see all the mangoes from these areas become free from fruit flies."

The future of Kenyan avocado exports rests on adherence to quality standards

The most topical agricultural buzzword around is increasingly becoming the value of avocado farming in Kenya.

Rightly so, we are seeing an upsurge in the number of farmers planting avocado trees in the desire to improve their incomes. However, the critical question which needs to be asked is; are we as Kenya and Kenyan farmers exploiting our true market potential for avocados?

Avocado production is not new to Kenya, in fact the first commercial plantings were established many decades ago.

More recently various large-scale players are becoming involved however, in the last five years, there has been a significant increase in the production of Hass avocados from smallholder farmers which together with production from larger farms has made Kenya's volumes grow significantly, positioning us as the 8th largest exporter in the world.

Kakuzi Managing Director, Chris Flowers

"Making sure that only the correct quality fruit reaches the market is essential but must also be matched with other key aspects."

But what does that mean in the global avocado market?

We may be the 8th largest exporter in the world but in comparison to worldwide producers this is still very small.

Also bear in mind that there are major producing countries who actually don't export or only export a smaller amount as the product is so popular domestically, for example the Dominican Republic and Mexico.

Just to put this in perspective Kenya exports annually around 70,000 tonnes of Hass and Green Skin varieties. Mexico the world's largest producer grows 2,500,000 tonnes of Hass alone.

We need to take stock of the production levels from the countries Kenya competes with in our marketing window. Just as an example from last year, in a peak week Peru exported to Europe 657 shipping containers of Hass. In the same week, South Africa exported 74 containers and Kenya exported 37.

What should we be doing to make consumers buy Kenyan fruits rather than Peruvian or South African?

For most products to improve demand you have to ensure that the consumer has an excellent experience when they consume Kenyan fruit.

As Kenyan and worldwide production levels increase, we need to grow Kenyan's market access. Reports indicate that by 2030 half of the worlds fresh produce will be consumed in Asia. Access for conventional fruits into these markets is essential.

So what makes someone want to buy Kenyan fruit?

This is the crucial question, and the answer lies in our Quality, Traceability and Sustainability protocols.

The world's consumers are demanding more of us as farmers, perhaps without necessarily respecting that commodity prices must also be sustainable. That perhaps is a different argument, but we need to sell our fruit at the end of the day.

The market is measuring us on pesticide residues, water sustainability, soil preservation, 'food miles' and numerous other indices. We have to be able to demonstrate compliance for arguably two reasons.

Firstly, simple economics. Some markets will not emphasise this, but then we are limiting competition for our fruit. Does that make sense?

Secondly and perhaps more importantly. It's the right thing to do; we do have a responsibility to our future generations. This responsibility is to leave them the soil, water, and environment in better shape than we found it and have developed their economic sustainability through a thriving avocado industry built on Quality, Traceability and Sustainability.

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Customer requirements for quality may seem easy yet so stringent and unforgiving. No consumer in the local or even global market wants to buy fruit that never ripens or cuts into one and finds it rotten inside.

To deliver quality products to the market, we must ensure proper crop husbandry including fertiliser and related inputs, application at the right stage. Harvesting, too, must be at the correct maturity level, and the correct post-harvest and cold chain management protocols adhered to the letter.

Sounds simple right?

Like all things, it never is. If we are to do this better, we must invest further in our extension services, training, technology transfer, and strengthening our regulatory authorities.

The markets also don't help us. A shortage of avocados in Europe will send agents clamouring for their phones, demanding "any available" fruit. In the hope of making a quick buck, brokers dash to farmer's fields to harvest anything that looks like an avocado, regardless of whether it is mature or not.

Some money may be made but at what cost?

The answer is our nation's reputation. Unfortunately, the reputation of Kenya for avocados is not good. If demand for our fruit will grow to match the increased production levels, we have to improve our reputation as a quality producer.

Failing to do that could mean that Kenya remains the cheap last resort when nothing else is available. A market space that others will quickly take from us.

The second part is traceability. What does this mean?

In a nutshell, the ability to trace the fruit from 'field to fork'. We must trace a carton of fruit back to the grower who produced it and, more importantly, have confidence that the grower produced it in the agreed and prescribed manner. This not only covers food safety but also covers social accreditation standards and the contentious area of phytosanitary requirements.

So how do we achieve traceability?

One answer is developing organised and well-managed farmer groups comprising all avocado farmers within a specific and reasonably localised area. We should, however, ensure that whilst farmers are provided with skills to grow the crop correctly through these groups, the payments made should be to each farmer directly from the exporter, not through an intermediary.

Creating and strengthening farmer groups is key, as is access to our farmers' correct agrochemicals and training on using these and compliance with sensible, strict and uniformly applied standards.

Who is going to do this?

Exporters must play their part in this journey and our development partners as ultimately building the quality reputation of Kenya is good for the Nation and good for business.

We can't just be advising framers to grow more fruit if we don't have a clear strategy for where and to whom we are going to sell the product, and without traceability, the markets become limited.

The final part of the story, but by no means the least, is sustainability. As a country, we are acutely aware of climate change; we live with its effects daily, not just in our agricultural sector but also in the havoc it plays on our homes, roads, and sanitation.

But is sustainability all about climate change? Perhaps ultimately, it all comes down to the same thing, protecting our planet for future generations and thus, indirectly, how we grow our fruit is essential.

Mr Flowers is the Managing Director at Kakuzi Plc. Email: mail@kakuzi.co.ke

Mealybugs:
Early Intervention is Key to Avoid a Costly Infestation

Mealybugs pose a serious threat to growers in warmer climates as they can significantly reduce the productivity and yield of greenhouse crops. But lessons-learnt from greenhouse rose farms in Kenya demonstrate that it is possible to manage Mealybugs when the right tactics are deployed, such as early intervention supported by an effective scouting system, writes Edwin Kiptarus and Simon Kihungu

Mealybugs have taken on a renewed significance with the recent arrival and rapid spread in Kenya of the Papaya mealybug, Paracoccus marginatus. Although not the same species as the Coffee mealybug, Planococcus kenyae, generally found on roses in Kenya, both are quarantine pests that have the potential to spread viruses along fresh cut flower pathways. Other Species of Mealybugs that affects ornamentals are: Common examples include the long tailed mealybug (Pseudococcus longispinus), which has characteristically long waxy filaments that protrude from the end of the abdomen, and the obscure mealybug (Pseudococcus viburni), which also has waxy filaments, but they are much shorter in comparison to the longtailed mealybug. Citrus mealybug (Planococcus citri), lacks any waxy filaments and has a gray stripe that extends the length of the body. The differences are shown in the image below:

Now more than ever, rose growers in the global cut flower trade need to keep track of the Mealybug situation and stay alert to the pest's potential to spread to other markets. The Australian government reports that they have seen a steady rise of the pest over the last thirty years, with one-fifth of Mealybug interceptions on cut flowers and foliage, most of those were found on roses.

In the past, strong miticides used to manage the spread of spider mites were also effective at controlling the spread of Mealybugs and other pests. However, recent developments in pest management have resulted in pesticides being replaced by biological controls, and this has allowed Mealybugs to develop at uncontrollable rates. The warm temperatures of greenhouses also contribute to the Mealybug problem, as they are ideal conditions for crawlers to hatch. Once the immature scale crawlers emerge, Mealybugs can quickly spread to new plant parts and new hosts.

Left untreated, Mealybugs can severely affect crop productivity, in terms of quality and quantity, as they produce a toxic saliva that interrupts plant growth. Unlike other crop pests, they hide in the crevices between branches and the underside of plant leaves and steps. This means their rapid development often escapes detection until it is too late to contain the spread. The bugs' ability to avoid detection means it is hard to begin the required aggressive investment in control and eradication measures, especially as the pests don't show up in post-harvest figures.

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1. Detection is key during the initial stages

A widespread Mealybug outbreak in the greenhouse can be avoided if you detect the pest early and take immediate action to contain the infestation. If allowed to spread, Mealybugs can become extremely difficult to eliminate due to their high reproduction rates – adult females can lay up to 600 eggs and reach damaging population levels quickly. To avoid this development, an in-depth knowledge of the insect's biology is crucial to early scouting efforts.

Plant material needs to be checked for white cotton-like substances and sticky honeydews – clear signs that Mealybugs are present. If you miss this step, Mealybugs can produce large amounts of honeydew that supports the growth of black sooty mould, which interferes with plant respiration and transpiration. Plants infested with root mealybugs that go unnoticed can serve as a source for further spread to healthy plants, as these mealybugs easily move with water by leaching through drain holes in pots and then crawling into adjacent potted plants, where they become further established on the roots.

2. Keep it clean with cultural and mechanical controls - good greenhouse hygiene can keep the unwanted pest at bay

But more is required during the initial stages of Mealybug intervention. When introducing crops to growing areas, you should thoroughly inspect all plant materials to protect clean areas of the greenhouse from infestation. During the early stages of crop development, it is essential to raise an alarm at the sight of Mealybugs so that management is informed and can take immediate steps to prevent a widespread infestation in the greenhouse.

To manage an early infestation, it is key to practice good greenhouse hygiene right from the initial stages of crop development. For instance, debris needs to be regularly swept away from the greenhouse floor, as this tends to be a hotspot for Mealybug egg sacs. Growers should also avoid the tendency to over-water and over-fertilize the crop, as plants with high nitrogen levels and soft growth attract Mealybugs.

Unwanted material such as weeds, dead foliage, and hanging leaves should also be cut to allow the crop to open up during the early stages of plant development. This increases the level of coverage and can improve the effectiveness of intervention methods, such as spraying, that might be used in later stages.

Critical greenhouse hygiene measures also require a combination of cultural and mechanical controls to prevent the spread of infestation. For instance, you can protect clean areas of the greenhouse with the immediate removal of affected plants, crop and weed debris, and other plant parts. If agrobacterium tumefaciens sets in, growers need to monitor the rose crop for any fresh crown galls, as Mealybugs tend to hide inside and suck on the gall juice. On the detection of Mealybugs, you will need to dispose of the galls straight away and follow this step with a disinfection of the contaminated area. This way growers can significantly minimize Mealybug build-up and reduce the chances of re-infection. However, physical contact with infested plants should be kept to a minimum as Mealybugs easily adhere to clothing and implements.

3. Time for intervention? Start young - map for hotspots

Given that mealybugs can be found on various parts of the plant like the roots, the crop beddings, the crown galls, it is recommend that you drench a systemic insecticide to take care of the unseen infestation.

As Mealybugs can be hard to eradicate from the crop, you will need to follow up with early intervention tactics. It is key to start this intervention when Mealybugs are in the crawler stage and have yet to develop their white wax. For smaller spots, spot spraying is necessary.

High volume spraying to achieve good coverage of the infected area may only be necessary where the infestation is

Mealybugs on a stem

widespread. But regardless of the volume deemed appropriate, you need to target the Mealybugs in their hiding areas to disturb them from their colonies. At this stage an accurate mealybug map is essential to guide scouts to the hotspots where you need to target intervention.

4. Follow up with a rinse and repeat - high volume chemical spray

Despite initial success in disturbing them from their colonies, Mealybugs can continue to be a problem. We find a two-pronged approach extremely effective at this stage. First, you can spray soapy water or detergent onto the plants to desiccate and crack the waxy layer of the Mealybugs.

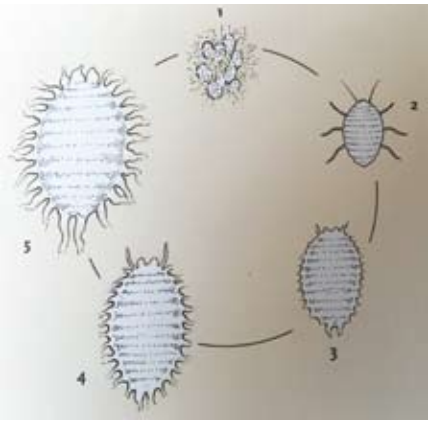
To target the Mealybugs, you will need a high-water volume and a suggested size 16 or 18 nozzle should help with effective coverage. During this step, growers need to direct the spray of soapy water or detergent on the hard leaves to avoid scorching the younger and less developed leaves.

Secondly, follow with a chemical spray with a pH between 5.0 and 6.0 to effectively curb the spread of the Mealybug infestation. Recommended chemical sprays can include systemic chemicals such as Acephate, Imidacloprid, Spirotetramat, Sulfoxaflor, and Acetamiprid.

To achieve widespread coverage, growers should apply the chemical spray two or three hours after the crop has been washed with soapy water or detergent. For cases where the Mealybug infestation is well-established, weekly or semi-weekly intervals between sprays is suggested for effective management. When you have the best control for Mealybugs using the right pesticides, it is important that you achieve a good coverage and use the right volumes and pressure.

5. Guarantee long-term sustainability with biological controls

To meet the ever-increasing demand for sustainable pest management, growers can incorporate biological controls into their long-term Mealybug strategies. The introduction of natural Mealybug enemies - such as parasitic wasps, ladybird beetles, and lacewings - can be a real game changer in pest management as worldwide production of these predators and parasitoids starts to increase. In particular,



the predatory ladybird beetle, Cryptolaemus montrouzieri can feed on Mealybug eggs from the beginning of their larvae stage.

This development helps growers reduce the population density of the pest. Growers can achieve a similar outcome if they place pheromone traps around their greenhouses, especially in Mealybug hotspots, to attract the winged males. The traps are an effective and sustainable measure to disrupt further reproduction.

The use of biological insecticides, which are a sustainable alternative to chemical pesticides, can also be a viable and

Mealybugs damages on a stem

effective way for growers to manage Mealybug infections in the long-term. Insecticides such as Neem Oil are a relatively new biological control method, but this does not discredit their effectiveness.

In recent years, the use of insecticides is gaining importance due to their potential to prevent the chances of a Mealybug resurgence. In particular, many Integrated Pest Management companies are continuing to develop biopesticides that minimize the development of resistance in key insect pests and protect non-target biodiversity — this has the potential to significantly alter Mealybug control strategies in the future.

Incorporating new control methods into pest management helps in the battle against an insatiable pest

Industrial growers need to meet the challenges of Mealybugs head on to protect crop productivity in greenhouses. This is where investing in an accurate and effective scouting system will help you achieve a successful long-term pest management.

While early intervention methods such as the use of undiluted alcohol, soapy water, and chemical sprays can be critical in reducing the size of the infestation, most sprays do not give the contact needed to eradicate the Mealybugs entirely. This is why a team of scouts armed with the knowledge and a reliable system to detect infestations early on is key to immediate intervention and will help growers win the battle against the insatiable pest.

Sustainability will never disappear from the agenda

When I wrote this column, we were on the eve of the extra Members' Council meeting on 20 May 2021. This meeting was organized to do justice to the objections of the petitioners. All members of Royal FloraHolland were allowed have their say.

Digital environmental registration and certification was also discussed. We have been occupied with this topic for quite some time. The question is, what's stopping us from setting things in motion, what's holding us back, and what do we need?

As a sustainable grower, I am involved with this topic on many fronts; with the auction as member of the Leading Team, in the FPC Alstroemeria where I am chair, with associations and boards outside the auction. You may ask yourself why I attach so much importance to this topic and why should we be busy with this as a cooperative together?

One thing that's certain in my opinion is that the future is in your hands with a sustainable company. Raw materials are becoming more scarce and we must have an answer to energy and water issues. And because I see that we as growers do many things right, but don't manage to communicate this to the outside world enough, a skewed picture of our profession arises. And that's a shame. Image is not only important for your own square meters of nursery, but for the entire sector.

Giving a bouquet of poison for Mother's Day; this still makes the headlines on an annual basis. As growers, this doesn't surprise us anymore. Evidently the media and parties like Greenpeace lap this up. But we know better as growers. We don't spray more than necessary and we don't actually heat with the windows open. We know that, but do they - the environmental activists, our customers (the consumer) and the government - know that too? We have nothing to hide, do we? So let's all make transparency our main goal.

It's time for the flower sector to have a good image.

Of course, we're all different and we run our businesses differently. Growing is a hobby for one person, while for the other it's his/her livelihood. One person works among the plants every day, while the other works more on the computer. We all take a different approach therefore. But what we all want as a sector is a good image; no grower could be opposed to that, could they? That is the reason that we all have to buckle down to make our chain transparent. It begins with digital registration, so that we can proactively show which energy we put in our products! Not because the trade wants it, not because Royal FloraHolland wants it, but because we want it as growers: selling our products with pride! And because we owe it to the generations that come after us: leaving behind a more beautiful world.

Let us not forget that all of us growers together are a large group that, if we are all on the same page, we can move Mountains to ensure our beautiful products find their way to the customers.

And how fine it is then that we are a cooperative with a company that stands up for everyone; that sits around the table at the certification institutes, that looked for a second supplier and that negotiated on the price. It is precisely because we are taking up the gauntlet now that there is movement in the suppliers' market. A second supplier has come along and market leader MPS has adjusted its prices downwards. I also hear the growers, of course, who say 'I'm not going to do anything yet until the trade demands it'. The commitment of the trade to visibly and transparently participate in this is very important, but let's not wait for that to happen. Let's be honest: a trader always wants to have a choice, but if we register in the same manner, nobody can ignore our products and we will maintain control ourselves.

Karolien Tesselaar van Tilburg - Royal Floraholland

Above all, let us keep things moving. With all the current pressure on climate change, scarcity of raw materials and nitrogen policy, it's only a matter of time before the government knocks on our doors and imposes rules. You can better be prepared for that. Fortunately, we are a strong cooperative, which is going to be at the helm and take action itself. Sustainable business is never going away now and as far as I'm concerned sustainability will also never disappear from our cooperative agenda.

Karolien Tesselaar van Tilburg
Tesselaar Alstroemeria and member of the Members' Council of Royal FloraHolland

The strength of the clock

Mr. Ruud Knorr - CEO, Floraholland.

In the run-up to Mother's Day, Royal FloraHolland could not only report on the good turnover on our market place, but could even report a week record turnover of over 170 million euros. This is partly thanks to the clock. The average price of cut flowers went through the ceiling. The share of the clock has declined in small steps in recent years to 40% last year. But cut flowers are still for the most part traded on the clock. The clock share of cut flowers in terms of turnover is 60% and in terms of volume 54%. This shows that the prices for cut flowers are higher on the clock than in the direct streams.

An auction by means of an auction clock is a unique instrument which is even called a 'Dutch auction' in English. The clock proves its worth day in and day out. Last year, € 1.8 billion worth of turnover was sold via the clock. This happened via almost 6,300 KOA connections divided among almost 1,500 customers. The Clock as a good sales instrument' is, after the good financial settlement, the main reason for growers' satisfaction with our services.

The fact that 93% of the growers supply the clock underlines its importance. Clock buyers even place the clock at number one. Of all buyers, 84% are active on the clock. There is no better instrument for achieving optimal pricing. The success of the clock over the past hundred years is proof of that. Moreover, there is a transparent market environment where an enormous diversity of supply and demand is brought together.

It is nice to see that the basic principles of the clock have remained unchanged in a hundred years. Nevertheless, it is necessary and important to keep the clock constantly in step with the times and to adjust it where necessary. The strength and vitality of the clock are reflected in the adjustments that have been made over time, but especially in recent years. For example, KOA has not only ensured a considerable increase in the buying public, it has also ensured that the auctioning could continue last year when the capacity in the auction rooms had to be drastically reduced. That was a blessing in these very difficult times!

Auction Clock

The dynamics of the clock require that we continuously test the auction policy against practice. As soon as necessary, we tighten the excesses policy and look at the loyalty of suppliers. A good example of process innovation is the growing clock pre-sales (KVV). KVV has a positive effect on price formation and therefore clearly adds value.

Of course, the clock does not stand alone. It is in fact a combination of deal-making, logistics and financial settlement. The clock thus fulfils the needs of users. We also do this by improving the reliability of information about product quality and developing a good and unambiguous complaints process. These are preconditions for a well-functioning clock. Another success factor is how and to what extent we can connect to the buyer's business processes in the future. Fulfilment logistics is our answer.

We are very careful with the clock. It is too important for that. In the course of time, a lot of research has been done and a lot of plans have been made. Before you change something, you have to be sure of yourself, of course. That also characterises our approach to Nationwide Auctioning. We have, for example, gained experience in the pilot project Cut-Anthurium and at the Eelde location, and we opt for a step-by-step implementation. We will make as many changes as possible in close consultation with growers and buyers. Nationwide Auctioning is a leap forward. We are investing everything in a good and soft landing.

After Mother's Day, we are already looking forward to the next peak moment, French Mother's Day on Sunday 30 May. I am curious to see whether we can maintain the good flow. It will not be down to the clock.

Ruud Knorr
CCO Royal FloraHolland

FLOWER & VEGETABLE FARMS IN KENYA

FARM NAME	PRODUCT	LOCATION	CONTACT PERSON	TELEPHONE	E-MAIL
AAA- Flowers-Rumuruti	Roses	Rumuruti	Anil	-	-
AAA- Flowers -Chui Farm	Roses	Timau	Phanuel Ochunga	07522506026	-
AAA-Simba Farm	Roses	Rumuruti	Eliud Wachiya	0727258218	-
Fairy Flowers	cutings	Limuru	Kennedy Kamau	0712204894	kenreal07@gmail.com
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	Salgaa	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	-	-	-
Beautyline	Flowers	Naivasha	Peter Gathiaka	0721392559	peter@beautyli.com
Big Flowers	Roses	Timau	Gideon Waweru	0721178974	-
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	Karani	0733529666	-
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
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	Jackson Mbanya	0723565630	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- 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	Osman	-	-
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
Florenza Ltd	Roses	Solai	Yogeesh	0737453768	farm.florenza@megaspingroup.com

FLOWER & VEGETABLE FARMS IN KENYA

FARM NAME	PRODUCT	LOCATION	CONTACT PERSON	TELEPHONE	E-MAIL
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 Ltd	Roses	Murungaru	Julius Oloo	0721465853	oloo@harvestflowers.com
Harvest Ltd	Roses	Athiriver	Julius Oloo	0721465853	oloo@harvestflowers.com
Harvest Ltd	Roses	Olkalou	Julius Oloo	0721465853	oloo@harvestflowers.com
Heritage Flowers Ltd	Roses	Rumuruti	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	Summer	Naivasha	Glory Gatwiri	0718328382	hamwe.production@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
Kikwetu		Mt. Kenya	Rathan	0787266007	
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	Roses	Naivasha	Jagtap Shahaji	0792547633	japtag@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	Chandrakant Bachche	0724639898	chandrakant.bachche@vegpro-group.com
Kongoni River Farm- Longonot	Roses	Naivasha	Ravi Sathe	0715173603	ravi.sathe@vegpro-group.com
Lamorna Ltd	Roses	Naivasha	Mureithi	0722238474	admin@lamornaflowers.com
Lathyflora		Limuru	Mbauni John	0753888126	info@lathyflora.com
Lauren International	Flowers	Thika	Dilip	0720796629	laurenflowers@accesskenya.co.ke
Laurel Investment	Roses	Nakuru	Rajedra 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
Mahee Flowers	Roses	Olkalao	Natarajan	0738999149	natarajan@eaga.co.ke
Maridadi Flowers	Flowers	Naivasha	Jack Kneppers	0733333289	jack@maridadiflowers.com
Maua Agritech	Flowers	Isinya	-	-	-
Mau Flora	Roses	Molo	Mahesh	0787765684	mahesh@mauflora.co.ke
Milenium Growers	Summer Flowers	-	Sushant Wankara	0731316000	sushant@marvelgreens.com
Molo Greens	Solidago, carnations	-			
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		0725848909	
Mzuurie Flowers - Winchester Farm	Flowers	Bahati		0725848909	
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	-	-	-
Panda Flowers	Roses	Naivasha	Vivek Sharma	0731040498	gm@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	Shakti	0739676998	gm@poriniflowers.com
Primarosa Flowers Ltd	Roses	Olnjororok	Peter G. Njagi	0718342381	production.mp2@primarosaflowers.com
Rain Forest Farmlands Ltd	Roses	Naivasha	Boniface Kiama	0718925040	longere@fleurafrica.com
Ravine Roses Flowers	Flowers	Nakuru	Peter Kamuren	0722780811	bkiama@fleurafrica.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	Pravin Yadhav	0735741774	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	Shantaram	0740212816	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	Naivasha	A Duzairajan	0794572232	farmmgr.tulaga@btfgroup.com
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	Cuttings	Limuru	Benard Adwarh	0753444230	adwarh@terrasolkenya.com
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	Japheth Chelal	0721770597	-
Zena Roses - Sosiani Farm	Roses	Eldoret	Jackson Mbanya	-	-
Sololo Agriculture	-	-	Andrew Tubei	-	-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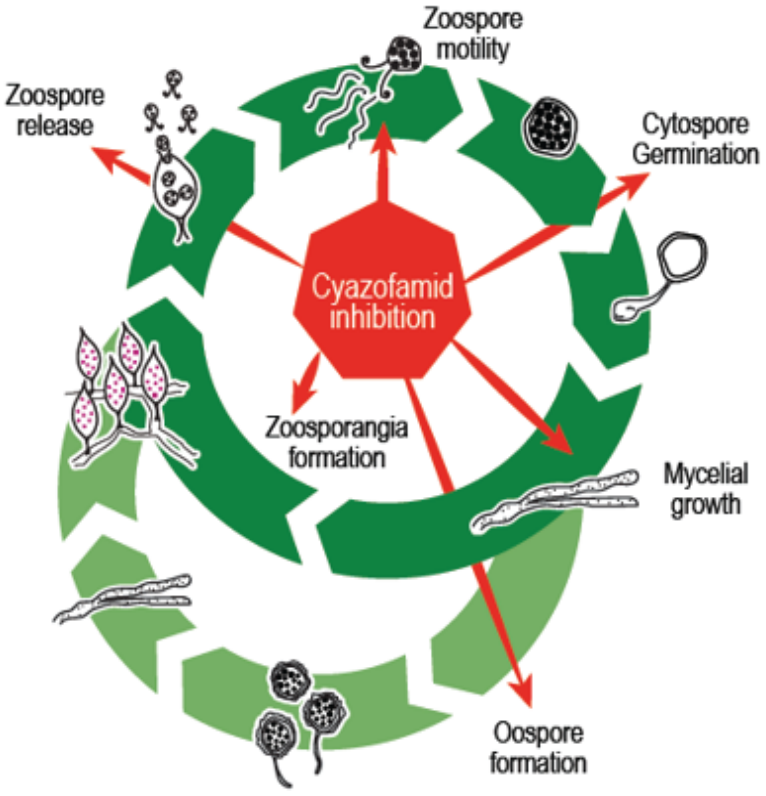

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