

Dutch know-how and technology for durable quality

Nine best practices in Ethiopia,
Kenya and Tanzania



Dutch know-how and technology for durable quality

Everyone in horticulture is looking for a profitable and sustainable set up of their business. This means continuous working on the 3-P's of Profit, Planet and People. In practice this involves improving the quality and quantity of production along with improving working conditions, reducing emissions and minimizing costs. Dutch know-how and technology can help you with this. The Dutch horticulture sector is very well renowned and is seen as an innovative industry with high standards of excellence throughout the world. Its know-how and expertise has grown and developed gradually in the past few decades and is now also available to you here in East Africa. Dutch suppliers and advisors are offering their services to you under the banner of "Green Farming". Green Farming combines Dutch technology and experience and can meet your specific production needs, so that you can rest assured of a totally custom-made product and service package, including on-farm training programs, maintenance and service cycles.

All partners in Green Farming complement one another in the areas of technology, know-how and experience. The application of Dutch technology can help you to improve the quality of your product, make your farm more productive and improve environmental performance and at the same time reduce your overall production costs. Green Farming is already active in East Africa, and has already realised a number of successful horticultural projects. This brochure gives you an overview about some of these projects. These examples demonstrate how Green Farming can help you realise the best solution for your farm. Together with Green Farming, partners for perfect solutions, you can have an edge over your competitors. We are convinced that Green Farming can help East African horticulture in meeting future market demands and improve overall sustainability and contribute to creating a prosperous horticulture sector.

It is a pleasure to present to you this brochure,

Harm Maters
President AVAG, Platform Horticulture Suppliers

Horticulture in East Africa

Potential for sustainable growth

East Africa offers great opportunities for professional horticulture. The climate and geography are ideal for growing flower and vegetable crops. As the welfare for people and the environment is of primary concern in the region, applying new horticultural technologies can help to achieve sustainable production.

Roses from Kenya and Ethiopia are already well known all over the world. In recent years vegetables from East Africa are also finding their way onto the international market. The region is particularly suited to growing a large variety of crops due to its varied climates and altitudes. As a result, the acreage under horticultural production is impressive (see table).

In the last few decades, many experienced growers from abroad have established modern farms in Africa and a great number of local investors have also started professional horticultural production. African growers can benefit from the experience of foreigners. Several Dutch suppliers continue to introduce useful knowledge and techniques to the region.

Application of new technology is essential for people, planet and profit

Care for the environment

The arrival of modern horticulture should not be at the expense of the environment. Water is a scarce resource, and climate change has led to drought conditions in the region. Responsible handling of water is of utmost priority. Therefore, innovative solutions are required to achieve sustainable horticulture development in the area.

As horticultural production in The Netherlands is highly developed, East African businesses can profit from their expertise to develop sustainable, environmentally friendly cropping systems. Process automation and reliable irrigation systems can help to achieve higher yields and better crop quality. Moreover, technical know-how and knowledge of best cultivation practices can be used to optimise the profitability of horticultural businesses.

In cooperation with Wageningen University & Research centre, Dutch suppliers and advisors are currently developing appropriate solutions for production under local conditions. For instance, they are researching how growers can use water and fertilisers as efficiently as possible. They have also set up a successful demo project with integrated pest management (IPM) to decrease the need for pesticides. Results from the demo project have been transformed into workable solutions for practical use, which safeguard a sustainable future for horticulture in East Africa.

Research results are transformed into workable solutions

Development partners

Although technology offers new opportunities, it is often a challenge for the people who must work with it. Therefore Dutch companies will provide on-farm instruction, training and technological support. A field extension service system with technicians will do their best to offer a solution within 24 hours should there be any malfunctions. This means vital security for growers. Choosing Dutch technology means choosing for quality and sustainability at an affordable price that will help save the environment.

HORTICULTURAL PRODUCTION IN EAST AFRICA IN 2009

Ethiopia	1000 hectares protected flower production and some thousands of hectares of open field and protected vegetable crops.
Kenya	3000 hectares protected flower production and 100,000 hectares open field and protected vegetable crops.
Tanzania	Some 200 hectares with 30 hectares production of young plants
Uganda	Some 150 hectares with 30 hectares production of young plants



Modern technologies for optimum water and fertiliser use



Rain water is collected in an enormous reservoir.

In early 2009, Olij Roses commissioned twelve hectares of greenhouses at Debre Zeit, Ethiopia. Responsible water management had highest priority, and thanks to Dutch installations, water consumption decreased by forty per cent when compared to traditional cropping methods.

Olij Roses is a leading family-run business with sites in the Netherlands, Kenya and Ethiopia. Olij Roses has been producing top-quality cut roses for almost a hundred years, and since 1980, they have been involved in cultivation and selection. They built a modern nursery in Ethiopia, which exploits tunnel greenhouses and places plants in coco slabs. Their new farm at Debre Zeit is close to several small lakes. The conservation of nature and the need to achieve sustainable rose produc-

tion requires specific irrigation solutions. Therefore, extensive research is undertaken before any new construction is started, so that water can be handled as responsibly as possible. Calculations established by Wageningen University & Research centre provide insight into how technology can contribute to crop-related water savings.

Re-use of water

For a cultivation business such as Olij Roses, good water quality is vital. Their plant material is always exclusive, and they cannot take any risks. Because water can only be re-used if it is clean, a reverse osmosis installation was built, where water is fed into a special installation using membranes. This reduces the water's EC level and also removes any bacteria, mould and viruses. Reverse osmosis leaves re-used water just as clean as rainwater, and therefore fertilisers can be applied more precisely. An economic use of fertiliser will save money.

With custom-made recirculation, nothing is lost

Calculations by Wageningen University & Research centre show that by using a combination of different technologies, it is possible to reduce water consumption by sixty to eighty per cent (see table). Olij Roses manager Phillipe Veijs says: "The research figures confirm our expectations

of technology, so we have chosen to set up our farm accordingly. Our acquired practical experience combined with today's market developments also mean we should be able to choose a somewhat simpler system."

Custom-made design

The new farm is fitted with cutting-edge irrigation equipment. As much rainwater is captured as possible, and drain water is re-circulated. Marco Braam of Bosman BV, installers says: "We have designed a wholly custom-made water installation for Olij Roses in Ethiopia. We didn't just supply technology, but a complete 'water management solution'. We work with a daily water storage in specially covered water silos, meaning no debris can fall into the water, and evaporation is totally prevented. The water is also cleaned with reverse osmosis, so fertilisers can be added at very exact dosages."



Olij Roses produces top quality roses in Debre Zeit.



Water silos are covered with special sheets protecting the water against algae growth and pollution.

A modern process computer controls irrigation, and this is adjusted to plant needs using humidity sensors. The actual saving now amounts to forty per cent compared with traditional cropping systems. "This is a good installation, one of the first in Ethiopia, and we have learnt a lot during the last three years," says Veijs. "Because of all its technology, the system is quite high-maintenance, but luckily enough, we have a local engineer. Any breakdowns can always be resolved quickly." He concludes: "We re-use water and fertilisers, and nothing is lost. That's good for the environment and for our purse."

WATER SAVINGS ACHIEVED THROUGH DIFFERENT TECHNOLOGIES (SOURCE: VAN OS, ELINGS & VOOGT, WAGENINGEN UNIVERSITY & RESEARCH CENTRE, 2009)

Technology	Saving
Reduced drain	20%
Storing and using rainwater	20%
Recirculation drain water combined with reverse osmosis	20-40%
All technologies combined	60-80%



Expensive oil is replaced by solar energy

The Bilashaka Flowers rose growers in Naivasha have created a unique horticultural project. They use a revolutionary 'solar heating system' to heat their Kenyan tableland greenhouses in the mornings. This clean technology results in a better climate, less diseases in the crop and higher yields.

The sun is an inexhaustible energy source. With this idea in mind, rose growers Cor, Joost and Judith Zuurbier developed an alternative, oil-less heating system in cooperation with engineers

from Frans van Zaal Totaal Techniek. The growers have been working successfully with the innovative 'solar heating system' since 2007.

Heating greenhouses in the morning reduces risk of fungi

There were three reasons for the development of this system: firstly, the growers wanted to heat their greenhouse in the mornings. Secondly, they saw that the world market price of crude oil is steadily rising, so that a boiler-run heating system would not be cost-effective in the long term. And finally, the sun is a cleaner energy source than oil.

Higher yields

Zuurbier & Co started producing cut roses in East Africa in 2001. The company is running nineteen hectares of greenhouses at their Bilashaka Flowers farm in Kenya. "We are trying to have as little impact on the environment as possible," says manager Joost Zuurbier. He explains: "Technology is vital to this. Our greenhouses use various types of clean technology, and the solar heating system is one of them."

One important improvement in the greenhouse climate for roses in Kenya is the application of dry heat in the early morning. At night, temperatures fall considerably in the mountains, inevitably leading to dew formation on plants in the



To obtain maximum transmission efficiency, cleaning the panels is essential.

early morning. As a result there is a bigger risk of mould, such as botrytis and downy mildew. "Heating the greenhouse by one to five degrees has meant we almost always manage to prevent such problems," Zuurbier knows. "An integral advantage of heating is that it encourages plant growth more if temperatures are somewhat higher early in the day."

By now, these rose growers can look back on some years of experience with the solar heating system. They are extremely happy with it. The quality of their roses has improved: they have bigger heads and longer stems. Botrytis hardly ever occurs now, and they spray considerably less against downy mildew. Their total yield has therefore increased by some twenty per cent.

A simple system

Solar panels cover a surface 3200 m² in size at the site, sufficient to heat ten hectares of greenhouses for an average of four hours in the morn-

ing. By now, all greenhouses at the farm have been connected to the system, and the solar panel surface is being doubled.

The solar panels consist of blackened tubes containing circulating water. During daytime, the sun heats up the water, which is then stored with a temperature of fifty degrees Celsius in a buffer tank. The following morning, this warm water is pumped into the greenhouse pipes by the system. The heated air dries plants quickly, and mould has no chance. There is still a boiler installed for any cloudy periods, used to provide supplementary heat to the system. Although in practice, for 350 days of the year, there is no need for this.

For areas with much sun and cold nights, solar panels appear a good solution for morning greenhouse heating. This technology is relatively simple, and engineers from Frans van Zaal Totaal Techniek have calculated that the system would be profitable in many cases in East Africa.



Solar panels cover a surface of 3200 m², heating water up to fifty degrees Celsius in the daytime.



Water is pumped through blackened tubes.



Data are vital to optimising your climate



An optimum climate starts with measurements, so sensors are installed in the greenhouse.

To grow top-quality roses, you need a perfect climate. Sensors provide important information about growing factors such as light, temperature, RH and CO₂. These data can then be used to optimise your climate, rendering plants stronger and less susceptible to diseases.

In East Africa growing conditions differ substantially from location to location. Growers must therefore learn to manage the specific circumstances at their farm. To this end, information about what is happening in your green-

house and with your plants is required. That's something Arie van den Berg, of Van den Berg Roses Kenya BV in Naivasha, a farm with Dutch roots, knows well. The seventy hectare farm at Naivasha is located almost on the equator. Its director says: "We have a lot of sun in Kenya, with twelve hours of light and twelve hours of darkness every 24 hours. The temperature is very favourable for roses. Our farm lies at an altitude of 1850 meters above sea level. At night, temperatures with around eight to fifteen degrees are rather mild. During the day, temperatures don't climb any higher than twenty to 28 degrees. There is also quite a constant climate throughout the whole year, so greenhouses don't need heating, lighting or cooling."

Answers to questions

In principle, these are seemingly perfect climate conditions for growing high-quality products. "But", says Van den Berg, "although growing conditions are very good, we still have to pay the utmost attention to changes in the climate. For instance, you have to be particularly careful in the rainy season. Downy mildew and botrytis can cause much damage. Near the equator, the light intensity is also much higher than in moderate climate zones. We also grow on volcanic substrate with a high risk of excess water. Therefore, we always like to know what is happening with our plants."

Martin Helmich of Hoogendoorn Growth Management says: "An optimum climate starts with measurements. A grower needs answers to important questions, such as how much grow light

do plants receive? What are daytime and nighttime temperatures, etc? It is also good to know a plant's temperature. All data combined help to clarify what is happening in a plant. You can then adjust your climate controls, irrigation and misting accordingly. As much as possible, you must always ensure your plants are prevented from developing stress."

Remote monitoring

That's why sensors measuring temperature, light levels and CO₂ concentration are installed in the greenhouse. The soil's humidity content and the irrigation water's EC level are also determined. Plant temperature meters register the plant's condition. All these data are stored in a central computer, and both grower and adviser can view these data remotely.

"We use these figures to analyse what is happening in the greenhouse, and what the plants' re-



A better climate leads to higher yields and improved quality.



Van den Berg Roses has built modern greenhouses with good ventilation facilities.

action to this is," says Van den Berg. "That's how we keep learning. We can establish more easily whether plants are suffering stress, or if there is a chance of pests and diseases striking. Based on the data collected, we can for instance control our vents better. Irrigation and pest control measures can be optimised this way."

If plants get what they want, quality and production improve

The grower concludes: "In East Africa, the use of sensors is vital. You can see what's happening in the greenhouse, and then test improvements. To measure is to know. This should eventually lead to a better climate and therefore higher yields and improved quality."



Joint search for the best system to grow in stonewool

Worldwide growers use stonewool to successfully produce tomatoes, roses and other plants. Stonewool offers several benefits for growing in East Africa as well, enabling economic and controlled water use and especially as a solution to the nematode problem. Jittu Horticulture PLC is currently looking into the options for using this substrate under local conditions.

Growing in stonewool has become an integral part of modern production in many horticultural companies. It offers big benefits, for instance, the facility to adjust water and fertilisers much more accurately to plant needs.

Drain water can also be re-used, resulting in considerable savings of both water and fertilisers. Stonewool also allows for better control of the root system with regard to pH, oxygen, temperature and disease pathogens. Finally, stonewool is sterile, and there is no need to disinfect the ground. This means less work and also a reduction in chemical agent use. With crops easier to control in stonewool, production is more uniform and of better quality.

Stonewool substrates can offer a solution for the nematode problem

But there is no experience of growing in stonewool in East Africa yet. Together with a stonewool supplier, vegetable grower Jittu Horticulture PLC has now started a trial, testing an adapted crop system with stonewool on some 2500 m². Dutch expert advisers are partnering in this field trial. Simultaneously, solutions to re-use stonewool as a base material are being developed.

Nematodes

With farms in Holeta, Debre Zeit, Koka and Awassa, Jittu Horticulture PLC is one of the largest vegetable growers in Ethiopia. The company was founded in 2006 and now produces several hundreds of hectares of vegetables and fruit, grown both in the open field and in greenhouses. Some 46 different types of products are

Jittu Horticulture PLC grows several hundred hectares of vegetables and fruit.



Tomatoes are grown on high wires to increase yields.

grown for export, amongst others to the United Emirates and Saudi-Arabia. The stonewool trial is run in Awassa. In Awassa Jittu has twenty hectares of modern greenhouses growing tomatoes, peppers, aubergines, cucumbers and peppers. Manager Jan Prins says: "We would like to be just as efficient in Ethiopia as growers are in The Netherlands. We also strive to supply top quality, and therefore work with Dutch varieties and technology, for instance growing tomatoes on high wires. Another vital consideration is to use water and fertilisers as economically as possible. Stonewool makes this possible."

The most important reason for growing away from the soil however is the big problem with nematodes. Prins: "We have nematodes galore here. You therefore have to disinfect the ground by treating it with steam or with pesticides. Steaming is very labour-intensive and we don't really want chemicals in the environment. Besides, you cannot always get the pesticides in Ethiopia either."

Suitability

The stonewool trial is run in a tomato greenhouse. "We start growing tomatoes in stonewool, but I think that we will eventually grow all vegetables out of the soil," says Prins. "We are developing crop systems suited for African conditions. In our trial, stonewool is therefore placed on the ground. We are draining to a central gutter between rows, catching drainwater for recirculation."

This system is quite different from the Dutch method, where stonewool is placed in hanging gutters. "For Ethiopia, this is too expensive, and not necessary either, as we have enough labour here," explains the crop manager. The trial is closely monitored by a crop advisor. He will undertake weekly plant measurements and collect all harvest data, too. A comparison will be made with a plot with cultivation in the soil. All data will then be analysed in a management program by DLV Plant. "I expect much from this trial," concludes Prins. "I learn something every day, and the support provided by the experts is very useful."



Jittu Horticulture PLC has built twenty hectares of modern greenhouses in Awassa.



Efficient chains ensure fresh produce from farm to customer

Care for fresh produce doesn't stop the moment it is harvested. Quality must be preserved during processing, storage and transport. This requires quick, efficient and clean processing. Technology can help with this.

What is fresh must remain fresh. This applies to flowers as well as fruit and vegetables. Producers spend months growing a good product, yet flaws during storage and transport can cause serious damage to quality in just one day.

Speed and timely delivery are essential in today's business

"That's why it is important to pay much attention to produce after harvesting. Quality starts to deteriorate at the very moment you cut flowers or harvest vegetables and fruits. The challenge is to minimize this quality loss to the minimum up to the moment of consuming. This is especially true in the case of produce from East Africa as it must cross long distances," says Tjeerd de Looze of UFO Supplies. "Poor post harvest handling has disastrous effects. Poor quality produce loses you a customer in much less time than it takes to make him return with a good product."

Clean and careful

Hygiene during processing is the first prerequisite to prevent fungi and bacteria growth. Fruit and



Fruit and vegetable growers processing their own produce must keep their produce and waste streams separate.

vegetable growers processing their own produce must therefore keep their produce and waste streams separate. Also flower growers have to care for their products. Preventing damage is essential. For instance, there are special holders for cut flowers to ensure the individual flowers do not damage each other, reducing the risk of botrytis. Equal important is to give immediately after harvesting special nutrients to the flowers.

Efficient workflow

The time between produce being harvested and its leaving the site must be as short as possible. "That requires good planning and organisation," says Joost van Klink of Celtic Koeling. "Flowers for instance, may not be touched and moved too

much during bundling. And a vegetable farm with many different types of produce in the processing hall requires an efficient workflow. You therefore must think carefully about the design of your processing and packaging lines, and intense staff support safeguards that they work in the correct manner."

Cold chain

Fresh produce stays better fresh at cold temperatures. So it is necessary to provide cooling during storage and transport. The temperature of the produce should be kept at two degrees Celsius and never be more than four degrees Celsius. Any deviations from this will have negative impact on the quality.

Interrupting the cold chain should be prevented at any cost. It is advisable to disinfect the air to prevent decay caused by bacteria and fungi. There are also specific techniques to prevent excessive respiration by fresh products during transport. This will counteract the aging process. Special measuring equipment can trace



Preventing damage during transport is essential to reducing the risk of botrytis.

any potential problems. Applying the right set of techniques in combination with an efficient and fast logistic chain make it quite well possible to keep produce fresh.

Transport

Shipping needs to be well organised. Speed and timely delivery are essential in today's business. "We help growers with all the formalities. Documents must be in order to prevent waits," says Moniek van de Put, of J. van de Put Fresh Cargo Handling. "We ship fragile produce. Therefore we make sure that the environment is perfect for all the individual products in case of mixed freights. Growers have to trust us to look after their produce carefully."

Providing an efficient chain from harvest to the moment of sale ensures produce retains its optimum quality. All those concerned can help with this. Technology and communication are vital to ensuring produce stays fresh, from farm to customer.



Leaves and thorns are removed before packaging.



Good equipment for better results



Fresia Ethiopia grows a crop seldom found in East Africa. These growers started from scratch.

To achieve an optimum climate, vents must open at just the right moment and irrigation must be just in time. A modern process computer linked to a measuring unit makes climate control easier for the grower. For crops which have not been grown in East Africa before, automation is vital.

Growers introducing crops not yet grown in East Africa must discover everything from scratch, as they can't just rely on their fellow growers' experience. Automation is then a vital tool. In the start-up phase, a computer provides the required basic information, and later during the

cropping period, automation can take much work off a grower's hands.

Partners in Green Farming can support growers who are starting with a new crop in East Africa. Martin Helmich says on behalf of the partners: "You must take many factors into account when starting a new business. It's not just all sorts of regulations and licences to be taken into account, but also the need to arrange finance, find suitable staff, etc. Growers then must familiarise themselves with the crop and come to grips with technology. With regard to the latter, we can assist businesses with their automation. After all, without measuring and registration, growers do not have the information they need. We supply computers and software enabling them to track temperature, humidity and light intensity. Based on these data, climate and irrigation can then be optimised, resulting in high-quality products."

Fresias

Fresia Ethiopia is one of the farms growing a crop seldom found in East Africa. After preliminary research in a trial greenhouse, the initiators - the Ethiopian investors Samrawit and Thomas Moges - took the step of cooperating with a group of six Dutch fresia growers. They constructed a nursery of three hectares using the latest equipment.

Samrawit Moges is happy with this cooperation, saying: "Two heads are better than one. We know the regulations and mentality in Ethiopia. The Dutch introduce their know-how about flower crops." Mathieu Barendse, manager with Fresia Ethiopia, is also content: "The Ethiopian

highlands provide ideal growing conditions for fresias. The soil is also very suitable for fresias, so we had a good feeling right from the start."

Computer is indispensable for the collection of information

The fresia farm is now run by three local managers. Barendse: "We have a good cooperation, and we have regular meetings with our investors and local managers. Business is running well."

Automatic ventilation

The Dutch growers have undertaken thorough research before they built in the highlands. "After the first trials, we were convinced that we needed the best available equipment to make this project a real success. We have constructed modern tunnel greenhouses with good ventilation, and also bought a steam boiler to disinfect the soil."

The investment not only involved greenhouses

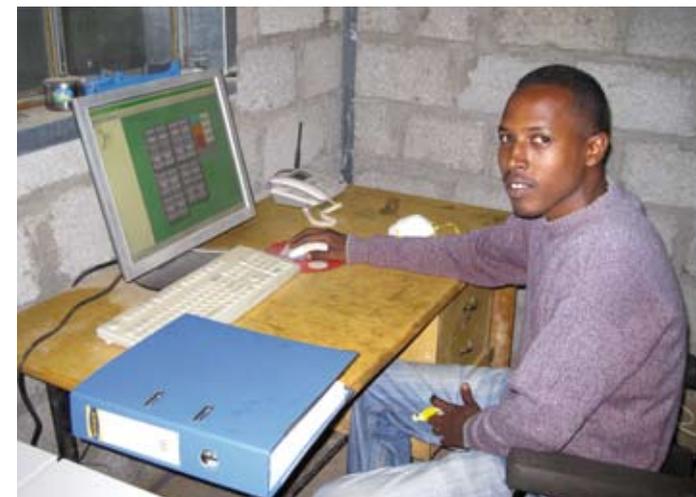


A weather station installed five meters above the greenhouse provides information on radiation, wind speed, outside temperature and humidity.

and soil disinfection facilities but also modern process automation. A weather station has been installed five meters above the greenhouse. Every section has got its own measuring unit to provide information about the temperature, the amount of light and humidity. Based on these measurements, the climate computer now regulates the position of the vents fully automatically. Irrigation and fertiliser dosing are totally automated as well. "This saves an enormous amount of work and provides a balanced climate," says the fresia grower.

Learning together

"We still have to learn. Registering climate data via the computer is vital. Another benefit is that, in nearby future, we can view these data remotely via a wireless internet connection. We can always consult with our managers about what is happening in the greenhouse, even if we aren't in the Ethiopia. Thanks to all the insights provided by the computer our African partners and we are learning together every day," says Barendse in conclusion.



Computer registration provides valuable insights.



Quality roses are grown with integrated pest management

Pest and diseases are serious problems when growing roses. Integrated Pest Management (IPM) offers a good alternative to solely pesticide use. Experiences with IPM are good. Spider mites, the most widespread pest in rose, are brought under control. Moreover, the crop produces more flowers, longer stems and better-looking buds.

Just like anywhere else in the world, chemicals are no longer the answer to pests and diseases in East Africa. They affect the crop, the workers and the environment. In addition, many pesticides are less effective, as pests are becoming resistant to them. It also appears polyethylene greenhouses are affected by such chemicals. Moreover, consumers increasingly demand environmentally-friendly grown products.



Scouts are instructed on how to monitor pests in the crop.

Alternatives to chemicals must be developed, such as Integrated Pest Management (IPM). That is why the Ethiopian Horticulture Producer Exporters Association (EHPEA) and the Ethiopian Government have put the introduction of IPM high on the agenda. In the framework of the public-private Ethiopia-Netherlands Horticulture Partnership a program is implemented in which Ethiopian and Dutch researchers assist the sector in testing and implementing IPM strategies. They are cooperating, among others, with experts from Koppert BV, suppliers of beneficial predators, and Wageningen University and Research centre.

Consumers increasingly demand environmentally-friendly grown flowers

In November 2007, the ET Highlands rose farm first started IPM-trials. Results were so good that in October 2008, ET Highlands decided to switch to IPM in all 23 greenhouses at their farm. Now this example is being followed; an increasing number of growers in East Africa feel confident to start with this new approach in pest management.

Combined measures

Dr. Eefje den Belder from Wageningen University & Research centre explains how it works:



Predators are released in the greenhouse to tackle the spider mite problem.

“With IPM, different techniques are used to prevent pests and diseases from causing damage. It is vital in this respect to know which and how many insects are present and what is the infestation level of the disease in the greenhouse. ‘Scouting’ the crop is crucial. If you know the pest pressure, you can release the correct number of their natural enemies.”

The greenhouse climate has a role to play in the success of biological plant protection. Den Belder: “We have found that under local conditions in East Africa, releasing predators in the greenhouse is a good approach in tackling the spider mite problem. Of course, sometimes it is necessary to apply an additional selective soft chemical to control aphids, whitefly, caterpillars and fungi.”

Support

Pests and diseases in a rose production must be regularly monitored. Scouts have to be able to recognise insects and diseases, and to quantify their numbers. In cooperation with Koppert Wageningen University & Research centre has developed training materials for staff, for instance practical instruction cards and formats. Scouts

can take these along into the greenhouse and can then name any insects and moulds found. Ed Moerman of Koppert says: “We provide intensive support to farmers switching to IPM. Every three to four weeks, we visit the farm for backstopping. Koppert is employing a local consultant for this.”

Reliable approach

In 2008, J.J. Kothari, Dream Flowers and Oromia Wonders rose growing farmers also started using IPM. Manager Bhausahab Kondaji Navale of Oromia Wonders explains why: “We had big problems with spider mites. Backstopped by Koppert and Wageningen University & Research centre, we have switched from only chemicals to the introduction of predators. The spider mite population has seen a drastic reduction even in the first two months using IPM.”

He is happy with the results: “The quality of our roses has seen enormous improvements. Stems are longer, buds are thicker, and the colour of both flowers and leaves is also more intense, which considerable increases productivity.” But that is not all, Navale: “We are less dependent on chemicals. That’s good for the environment and for our staff, not forgetting that our customers are demanding sustainably grown roses as well.”



With IPM, flowers in the greenhouse show more intense colour.



Economic water use thanks to modern irrigation



Fides Tanzania Ltd. has built modern greenhouses for the cultivation of parental plants.

A number of modern propagation farms have sprung up around Arusha in Tanzania. Accurate and precise irrigation is vital for these companies. Fides Tanzania Ltd. recently installed special humidity sensors. Plants now receive the exact amount of water they need, benefiting the quality of the final product.

Cutting stock must be vigorous and healthy, and has to be uniform and available all year round. Propagation farms are increasingly moving to areas as close to the equator as possible, because

of the perfect climate. In 2005, this was the reason why the Dutch Fides organisation started producing geranium cuttings in Tanzania. They established their farm ten kilometres east of the town of Arusha. At an altitude of 1250 metre, there is now a quickly expanding horticultural zone, where some ten other ornamental farms have been established so far.

Every single crop section is watered individually

Fides Tanzania Ltd. is no longer just producing geranium cuttings, but now grows kalanchoe and chrysanthemum cuttings as well. The mother plants are carefully cultivated in twenty plastic tunnel greenhouses each 5000 m² in size. Cuttings are taken by hand, and are packaged and transported by plane to Europe in their rootless state. The production has reached an area of ten hectares.

Economical with water

“From the very start, our goal was to use water economically,” says managing director Bert Kuyper of Fides Tanzania. “We therefore established a modern irrigation system, enabling us to water every single crop section individually.” The combined use of water from a borehole and a river assures a steady water supply. Parental material is planted in plastic bags filled with small stones, so-called pumice. This medium is available locally and turns out to be

a very suitable growing medium for plants. In kalanchoe and geraniums, water is applied via drip irrigation using micro tubes with pressure compensated arrow drippers. Chrysanthemums are watered from above and also irrigated from below using a drip line. The aim is to provide exactly the amount of water the plants need. Excess drain is captured and the amount of water and fertilisers absorbed is registered. “We have to be economic with water, because we cannot re-use drain water. Growing mother plants is subject to strict sanitary restrictions.



Chrysanthemum cuttings are carefully taken by hand.



Kalanchoe are grown in pumice, with water applied via drip irrigation using micro tubes.

We must prevent viruses and bacteria from being introduced in the water,” says Kuyper.

Sensors

The grower is continuously trying to improve irrigation efficiency. For this reason, a special humidity sensor system called Sensiplant was recently installed in a number of greenhouses. Sensiplant is a wireless measuring system to determine the humidity of the growing medium. The system records the pumice’s humidity content and transmits this data to a computer at the office. The irrigation strategy can then be optimised, to provide the plants with the exact amount of water needed and at the right moment. “It is a pleasure to work with the system,” says Kuyper. “Thanks to optimal irrigation, fewer plants are lost and the plants are of better quality. In addition, we save on fertiliser. We are continuously trying to optimise production.”

Your partner for growing sustainable profits

A modern horticultural setting requires expertise in order to take advantage of new technologies. Dutch suppliers have the capability of providing essential technological support for the practical implementation of such technology. In addition, service engineers are available at all hours to fix any breakdowns.

Horticultural innovations from The Netherlands will enable East African horticulture to advance rapidly. Modern technologies make economic handling of water and fertilisers possible. Additionally, new methods of plant protection can reduce chemical use, and optimised climate control methods can increase yields. Dutch technologies and knowledge applied to horticulture will guarantee sustainability for People, Planet and Profit.

Training

Working with modern technologies requires new skills. "We spend a lot of time supporting farms that work with new technologies," explains Francis Hoogerwerf from DLV Plant. "We visit such farms regularly to give advice and to discuss workers' questions. Besides farm visits, we organise trainings where people learn how to incorporate technologies in their management practices."

Support

Growers in East Africa can benefit from the guidance of experienced Dutch advisors. They can provide indispensable advice with regard to both current crop-technology developments and management queries. Additionally, experts from

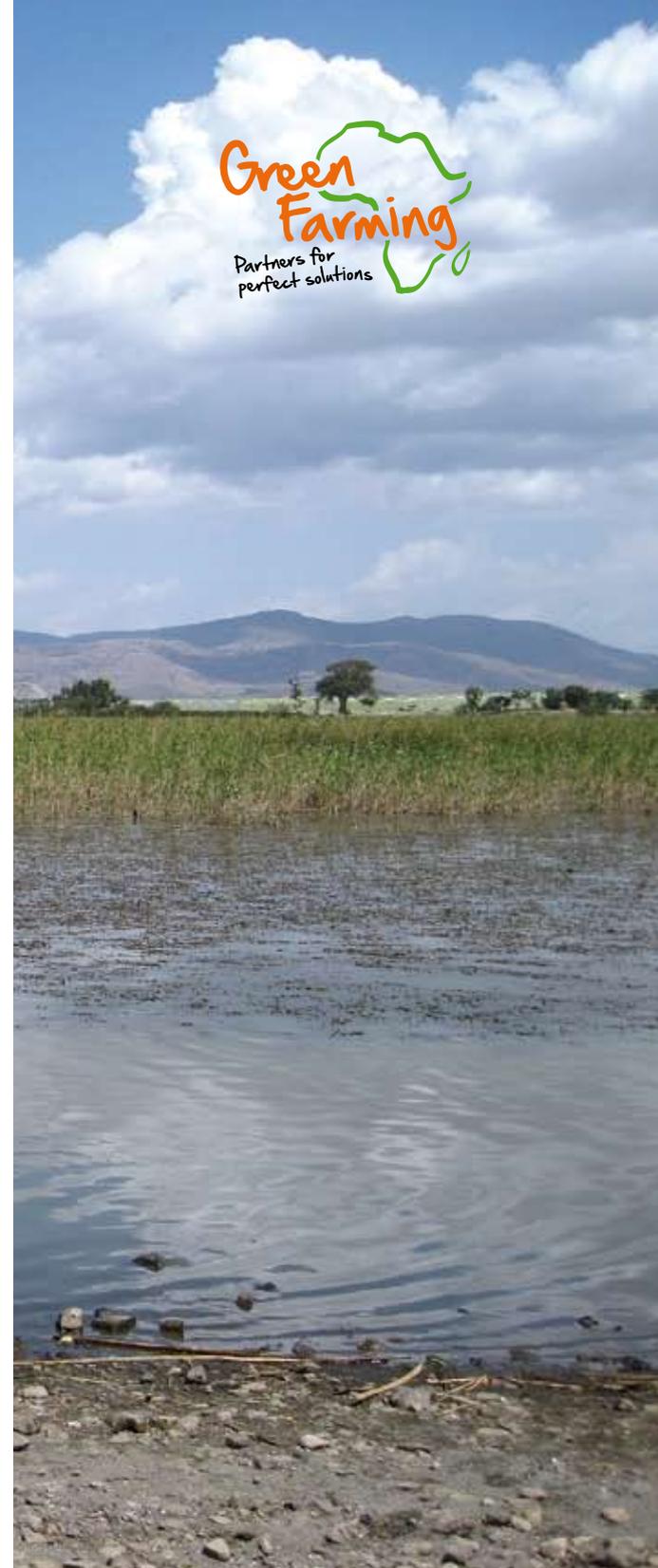
Wageningen University are giving support by developing know-how based on on-farm research and experiments.



Service engineers are always available to visit farms to solve any problems.

Service

Technology requires regular maintenance. The program offers a unique option for annual equipment checks. This prevents growers from experiencing unforeseen difficulties, and they can rest assured that their systems will always function properly. Dutch products are of high quality. "At times though, some parts may not work perfectly," says Dirk Sassen of Bosman BV, installers. "We know that breakdowns are unacceptable for crops. We therefore offer local service for computer and irrigation systems. Expert installers are always available to visit a farm to solve any problems, 24 hours a day. Dutch suppliers will be your partner by providing durable technology to realise a sustainable and profitable business."



Green Farming
Partners for perfect solutions

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