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KNOWLEDGE REVIEW
Best practices in sustainable horticulture
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Best Practices in Sustainable Horticulture

Colophon

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INTRODUCTION

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The Dutch horticultural sector is an international leader, and our colleagues abroad look up to the unique and mutual cooperation in the Netherlands between industry, research and education institutes and the government. This intensive knowledge exchange and interaction between scientists, advisors, companies and end users is one of the key factors behind the successful innovations in Dutch horticulture.

Building on their experiences in 2011, the Horti Fair organisers deliberately chose to focus on this interaction between the various parties during the HortiSeminars. The series of 17 fascinating seminars was attended by some 700 interested visitors from around the world. They were offered a broad programme covering a wide range of subjects, from technology and marketing innovations to internationalisation in Central America.

The visitor response was very positive, with the interaction related to best practices and the opportunities for international contacts being most highly valued. The choice of English as the preferred language during the presentations also made a considerable contribution to facilitating our international guests.

The Dutch horticultural sector made excellent use of this golden opportunity to take further steps in terms of internationalisation and export promotion. And the second edition of the HortiSeminars can certainly be described as being a successful part of the Horti Fair 2012.
A MORE HOMOGENOUS GREENHOUSE CLIMATE WITH SMALL WIRELESS SENSORS

By: Jos Balendonck, Wageningen UR Greenhouse Horticulture

Faced by major climate variations within their greenhouses, growers regularly use more energy than is desirable to prevent diseases. A measurement network of wireless sensors can help gain insight into climate variations and detect bottlenecks in the greenhouse. This will allow growers to take specific measures that offer more homogenous crops as well as energy savings.

As greenhouses grow in size, growers often notice that the temperature variations increase pro rata. “Variations in temperature, light and CO₂ concentrations have a direct effect on photosynthesis and thus production,” according to Marc Vergeldt of GreenQ. He said that a more constant climate will contribute to stronger plants, more homogenous crops, fewer diseases, less labour and a higher yield.

According to some growers, climate variations can result in income losses of between two and five percent. While making the greenhouse climate more homogenous is a solution, it is often difficult to realise in practice. A network of wireless sensors is a practical tool for specific climate improvement.

A dens sensor network
Wageningen UR Greenhouse Horticulture performed measurements with a dense measurement network of 100 sensors per hectare at the facilities of four growers. Scientist Jos Balendonck explained how they found major variations in temperature (up to 7°C) and relative humidity (RH) (up to 32%) during the night. This results in a significant risk of leaf wetness and cool-wet spots that can manifest as fixed or roaming.

“Wireless systems are currently available that are very suitable for use within the greenhouse,” revealed Jouke Miedema of WirelessValue. In these systems, data interpretation takes place via a web-oriented system, and is tailored to a practical interpretation by the grower. This provides a clear overview of extremes in the greenhouse climate, and gives growers an easy insight into the effects of any adaptations they make. A dense sensor network can also provide a clearer insight into the spatial variability of the dew point.

Temporary or permanent
A sensor network can be installed temporarily or permanently. A temporary system is mainly useful for new greenhouses or when a greenhouse is experiencing problems. Rob Wientjens of Climeco Engineering reported that simple and cheap adaptations to the greenhouse can sometimes result in considerable energy savings. A permanent sensor system can also be useful, allowing growers to interactively adapt the set points for the climate computer to realise maximum energy savings and prevent disease.

The management of individual heating units and ventilators directly based on a sensor network remains in the far future. However, positive results are expected soon with a dew point decision support system that calculates the optimal set point and relieves growers of extra work.

Partners in this HortiSeminar: GreenQ, Wireless Value and Climeco Engineering
AFFORDABLE ENERGY SAVINGS WITH NEXT GENERATION SEMI-CLOSED GREENHOUSE

By: Feije de Zwart, Wageningen UR Greenhouse Horticulture

A group of greenhouse builders and installers is introducing the Next Generation Semi-Closed Greenhouse, a concept built on technologies developed for the Closed Greenhouse several years ago. This new concept is expected to offer an energy-saving alternative to non-illuminated vegetable production in moderate climates.

The Closed Greenhouse was introduced some ten years ago as an energy-saving alternative to traditional greenhouses. Its results were below expectations, though, and the concept acquired a poor reputation. Nonetheless, a group of greenhouse builders and installers believed that the design still contained useable and affordable elements, and decided to develop the Next Generation Semi-Closed Greenhouse.

A prototype of the greenhouse is realised on a plot of 4,000 m² at tomato grower Lans in Rilland (NL). The starting point was to enable that the windows can be kept closed as much as possible in winter by using a dehumidification system, while in summer the same system collects sustainable energy. The first overall results are expected in the spring of 2013.

On behalf of AVAG, the trade association for the Dutch greenhouse construction and installation sector, Bram van der Kooy discussed the concept in more detail, while Wilko Wisse of Lans Tomatoes placed the development into the framework of sustainable horticulture and Feije de Zwart of Wageningen UR Greenhouse Horticulture shared the theoretical backgrounds, based on the preliminary experiences.

Semi-closed instead of closed
The original Closed Greenhouse offered the possibility of saving 30 percent of energy by heating the greenhouse with a heat pump in winter. The heat pump uses heat from an aquifer, which cools down as a result and therefore needs to be rewarmed in summer. In the original Closed Greenhouse, a small part with a large cooling capacity was dedicated to this job while the larger fraction of the greenhouse remained standard.

In the Next Generation Semi-Closed Greenhouse, one single air conditioning system is used in the greenhouse. This system has a low cooling capacity (around 40 W/m²) and a small air circulation capacity of 10 m³/(m² hours). Nevertheless, this system can collect sufficient heat to regenerate the aquifer in summer. The same system can also be used to dehumidify the greenhouse in winter, preventing the need to open the windows while heating. The smaller cooling capacity in summer and heat demand in winter reduce the required aquifer capacity compared to the old generation of (semi-)closed greenhouses.

Positive results
Wageningen UR Greenhouse Horticulture and its partners have already performed measurements at tomato grower Lans which indicate that the expected performance is indeed being achieved. The Next Generation Semi-Closed Greenhouse is therefore expected to be a realistic and affordable alternative for greenhouses without artificial lighting, allowing vegetable growers to reduce the primary energy consumption to 20 m³ of natural gas per m² per year.

Partner in this HortiSeminar: AVAG
SUSTAINABLE HIGH-YIELD PRODUCTION IN THE ULTRACLIMA GREENHOUSE

By: Silke Hemming, Wageningen UR Greenhouse Horticulture

A new greenhouse concept has been developed by greenhouse constructor Kubo based on five pillars: High production, maximum food safety, minimal energy and water consumption, and optimum yield. The first UltraClima greenhouse, set up at Houweling Nurseries in California, became the world’s first commercial greenhouse to harvest more than 100 kg of tomatoes per m² on a large scale.

Air can also be circulated in the greenhouse, reducing the need for CO₂ dosing as well. The architects of the new greenhouse claim a yield increase of 20% due to higher light and CO₂ levels, a 15-35% lower energy consumption and a 25-50% lower CO₂ use. Crop production can become independent of outside conditions: Thanks to the complete climate control, ‘the plant is in charge’ and the greenhouse provides all that the crop requires.

Many hectares
Consultant Barend Löbker from Vortus pointed out that crops needs the right combination of light, temperature, CO₂ and humidity. He stressed the need to ‘Let go the traditional growing method’ and ‘Read your plant’.

Kubo’s UltraClima greenhouse has already been realised in various large scale greenhouse operations within the last four years, including Howelings Nurseries in California, Wholesum Harvest and Windset Farms in the US, others in the South of France, Turkey and Australia, and recently at Van der Kaaij in the Netherlands.

Partner in this HortiSeminar: Kubo
LEDS AND SON-T IN HYBRID LIGHTING AS BASIS FOR YEAR-ROUND TOMATO PRODUCTION

By: Arie de Gelder, Wageningen UR Greenhouse Horticulture

Vegetables and fruit that are trusted by the consumer in terms of safety and health are the future. Additionally, the products must have a constant quality and be available throughout the year. This can be achieved in a production system in which the LED lighting among the crops is combined with HPS above the crops. The first application in practice was recently realised.

LEDs are in, and after years of research the application of the LED technology is also increasing in agricultural systems such as greenhouses. Peter Klapwijk of GreenQ and Koos de Wit of Philips Lighting discussed whether the use of LED lighting in tomato cultivation is ready in practice.

Commercial growers face a huge challenge in anticipating new market developments. Consumer demands are currently more important than the production possibilities; the supermarkets dominate the market in Europe; production is becoming high-tech, and family businesses are being transformed into professionally operated organisations.

Anticipating trends
Only companies that know how to address these developments will survive. Peter Klapwijk painted a picture of the tomato company of the future in which the limited availability of production tools such as water, energy and fertiliser forces the grower into increasingly efficient production systems. The design of such a company should incorporate the local climate conditions with a special focus on the ratio between temperature and light. In tomato production, however, light is a limiting factor in many locations worldwide. In the low-light period of the year, the light sum is often less than 400 J/(cm² day), while a high production requires at least 1700 J/(cm².day).

An ideal combination
LEDs can be an important tool in situations that require extra light to produce a product of constant quality throughout the year. Philips Lighting is performing broad research into LED lighting in greenhouse horticulture. “LEDs are especially used in the cultivation of plants in climate cells,” Koos de Wit explained. “For applications in the production of vegetable and ornamental crops we performed experiments with LED lighting. These achieved good results with a higher production and reduced energy consumption.”

Although LEDs currently require a higher investment than traditional lighting, the Philips Lighting consultant already sees some good opportunities: “By placing HPS-lamps above and LED lighting between the tomato plants you can combine the best of both light sources, namely the wide spectrum and heat of SON-T and the high photosynthesis efficiency of LEDs.” The first tomato company in the Netherlands installed a system with such a combination on three hectares this autumn.

Partner in this HortiSeminar: Philips Lighting
GEOTHERMAL ENERGY: LIQUID GOLD FROM THE SOIL?

By: Jouke Campen, Wageningen UR Greenhouse Horticulture

Heating accounts for 40 percent of the annual energy consumption in the Netherlands. Geothermal energy, warm water from subterranean layers, could supply part of this heating demand. But what does this involve and how much will it cost? Greenhouse horticulture companies are finding out.

Many growers wonder whether they should switch to geothermal energy as a new source of energy to heat their greenhouses. Answering this question involves many aspects. The subterranean structure, which plays an important part, is an area that IF Technology has collected a lot of knowledge based on former oil extraction wells. The complex process of the licensing trajectory, subsidies and contracting geothermal projects is one of the key activities of Agro AdviesBuro. The technical realisation of a geothermal source also requires a lot of new expertise, which Arend Sosef has acquired in several projects. The three companies provided an overview of the practical aspects of geothermal energy for greenhouse horticulture companies.

Pros and cons
The use of geothermal energy has two main benefits: It is a sustainable energy source and, once functioning, the heating costs can be determined for years to come. A positive extra effect of geothermal energy is that gas is extracted from the well in addition to heat; and quite a lot of it: 1 m³ of gas per 1 m³ of water. A cubic metre of water contains approximately 210 MJ plus another 32 MJ of energy from the gas. Energy is, however, required to pump the warm water from the well and pump the cold water back; 1 kW of electricity is needed to extract between 10 and 40 kW of heat.

The costs for the maintenance and depreciation of a geothermal source are high (80,000 euros a year). As a result the source must be used optimally to be profitable. To achieve this, the greenhouse sector uses geothermal energy for the basic heat demand, and a boiler or a combined heat and power system for the additional heat demand. This makes matters more complex. Another disadvantage of the use of geothermal energy is that less CO₂ is available for the crops due to the reduced gas consumption. There must therefore be alternative CO₂ resources available. And finally, it is impossible to say with absolute certainty whether the well will actually supply the required heat, which makes the considerable investment risky.

Not free, but profitable
By late 2012 there will be eight locations in the Netherlands using geothermal energy to heat greenhouses, and a large number of new projects are scheduled. Greenhouse horticulture is a ideal sector for the application of geothermal energy as the heat is supplied to a limited number of end users, making the procedural issues relatively simple. The geothermal heat source must, however, be exploited to the max to be able to compete with the use of natural gas.

Partners in this HortiSeminar: IF Technology, Agro AdviesBuro, Arend Sosef
The successful buying and selling of energy requires a sound understanding of macro-economic developments. Modern greenhouse horticulture companies face a major challenge in keeping up-to-date with the latest developments in the energy sector and translating them into appropriate actions. Powerhouse supports growers in this process and has developed a game that gives growers greater insight into the energy trade.

Dutch greenhouse horticulture is a very energy-intensive sector. Fossil fuel is still the main energy source for most modern greenhouse horticulture companies, many of which also have a combined heat and power system that produces heat as well as electricity. Growers can earn a lot of money through the intelligent trading of energy.

“To make the right decisions regarding the purchasing and sale of energy, it is very important that growers interpret news items the right way,” said Arjan Langeveld, portfolio-analyst at Powerhouse. “The energy price is affected by both major macro-economic developments and smaller day-to-day events. Those who respond in the right way can make a lot of money.”

Fiscal cliff
As an example Langeveld looked at the far-reaching effects of political developments in the United States. “In the USA people are increasingly talking about a ‘fiscal cliff’. A series of cutbacks and tax increases that will be implemented in early 2013. From the American standpoint these cutbacks and tax increases are extremely high. If these measures are indeed implemented in the 2013 budget, the population of the USA will have less money and spending power. In the long term this will affect the energy markets.”

Dollar rate
Another example is the fluctuation in the dollar rate. Langeveld: “A substantial decrease or increase of the dollar rate is directly reflected in the oil price. Fluctuations between a rate of 1.28 and 1.32 are barely noticeable, but once the rate goes above or below these levels it always has an effect. And because the oil and gas prices are linked, these fluctuations affect the entire energy market.” There are more global issues that impact the energy markets. Langeveld lists examples such as the tensions in the Middle East, the German overproduction of green energy, the increasing production of shale gas in the US, and the expectations of a cold winter.

“For most growers the energy trade isn’t their core business. To help them gain a clearer understanding we have developed a game that simulates the energy market. This game is used in workshops and we have received positive feedback from many participants,” says the analyst. Visitors to the HortiSeminar also had the opportunity to play the game.

Partner in this HortiSeminar: Powerhouse
SUSTAINABLE PRODUCTION BY COMBINING KNOWLEDGE

By: Jan Janse and Rob Meijer, Wageningen UR Greenhouse Horticulture

DLV Plant, Grodan, Koppert and Nunhems have joined forces in the Sustainable Growing Plaza platform. The goal is to help make horticulture more sustainable in the Netherlands and internationally. By jointly developing knowledge in the field of plants, greenhouse climates and root environment, the companies are creating new strategies for increasing production with a smaller input of energy, plant protection products and water.

Horticulture – in the Netherlands and worldwide – faces the challenge of supplying the ever increasing global population with food while minimising the impact of its activities on the environment. High production of quality vegetables with minimal means can be achieved by taking a joint approach to plants, greenhouse climates and root environments. The four companies have joined forces in the Sustainable Growing Plaza to gain synergies from their work on these factors.

Root environment
Rock wool producer Grodan underlines the role of the substrate in the concept of ‘Precision Growing’. Better substrate characteristics ensure the optimal distribution of water drops and a better management of the root environment, growth and water and nutrient use. Biological crop protection supplier Koppert developed the ‘Natugro concept’, which stimulates organic life in the root environment and increases disease resistance. It also reduces the need for crop protection products.

Plant and climate
Seed company Nunhems develops special cucumber varieties for high-wire cultivation. Their specific genetic characteristics achieve a higher production with less means when the proper cultivation measures are followed. DLV Plant has good experiences with these varieties in consultancy and research projects in Russia, Kenya and the Netherlands. Intelligent crop management can help realise high production with less use of energy, water, nutrients and crop protection products in which knowledge continues to be the deciding factor.

Intelligent combinations are key
The partners in the Sustainable Growing Plaza state that the joint knowledge development in the field of plant, root environment and climate is of the essence in realising more sustainable cultivation methods. The cooperation between the four partners forms an excellent foundation for increasing the sustainability of cultivation worldwide.

Partners in this HortiSeminar: Koppert Biological Systems, Grodan, Nunhems Zaden, DLV Plant

Participating in this HortiSeminar: Jan Janse and Rob Meijer, Wageningen UR Greenhouse Horticulture
MEASURING OXYGEN AND PH IN THE ROOT ENVIRONMENT

By: Chris Blok, Wageningen UR Greenhouse horticulture

New sensors for making observations in the substrate directly at the roots will soon become available. The sensors will provide additional information that can give better insight into the growth and development of crops. The companies Fytogoras/FFEW, Peacock & Black and Cultilène discussed the possibilities and their experiences at a plant nursery.

“The new sensors work in accordance with optochemical principles, which means that a dye held in a polymer shows discouloration,” Jan Joris Swart of Peacock & Black explained. “The level of discouloration depends on the oxygen or pH level and is measured with a fluorescence meter.” To determine the pH level, the company uses two wavelengths; the ratio between the wavelengths is determined so that the sensor becomes insensitive to the ageing of the dye. The oxygen level is determined by the rate at which the emission of light fades after a saturating light pulse, in which the relationship between the gradient of the fading curve and oxygen level is known. The pH and oxygen sensors are inexpensive.

Experiences with the oxygen sensor

Substrate measurements have shown that a considerable decrease in oxygen occurs when the water level rises two to three percent above a marginal value. “This indicates that the input of oxygen becomes substantially slower if there is just a little too much water in the substrate,” said Wessel Holtman of Fytogoras/FFW. Other measurements show that two instead of eight ppm of oxygen per litre of water in the root environment can reduce production by 10 to 30 percent with virtually no symptoms. In the daytime a root uses up to 50 mg of oxygen per cucumber plant per hour, which corresponds to 100 mg per hour per square metre.

Experiences with the pH sensor

Jan Willem Spaargaren of Cultilène described an experiment with the new low-cost sensor heads and pH sensor at the facilities of a plant grower. Normally the grower measures the water quality once a week with a glass electrode in one to three blocks, which first have to be squeezed (i.e. destructed) to subtract the water. In the new method, dozens of blocks were equipped with the new, low-cost sensor heads. The pH was read out with a hand meter that did not need to be calibrated. During a continuous measurement throughout one day, it was shown that with the screens shut in the evening, the pH increased by almost one full pH unit. The largest fluctuations in water quantity were visible around 13 to 18 days after the start of the cultivation, the point when little irrigation and lots of growth merge.

Conclusion

In the food industry, pH and oxygen levels are determined through the plastic packaging via pre-placed coloured spots. This light-based technology is now available for horticulture as well. The speed, ease and costs of the technology are more favourable than the former method for determining the oxygen and pH level. It has also been shown that the new technology provides a greater insight into cultivation management.

Partners in this HortiSeminar: Fytogoras/FFEW, Peacock & Black, Cultilène
PRECISION GROWING IS ABOUT MORE THAN JUST WATER AND NUTRIENTS

By: Erik van Os, Wageningen UR Greenhouse Horticulture

Precision growing is not only a matter of optimising the supply of water and nutrients. It is the next step to a better control of growth and production and to an emission-free production method. This new strategy was explained by Grodan, while Priva showcased how it might be realised using a process computer.

What is the best watering strategy and how can it be realised? Andrew Lee, crop consultant at Grodan, showed clearly that in a fibrous substrate such as stone wool the water content is the main strategic factor for controlling input and output. Hein Jasperse of Priva demonstrated how to realise this strategy on the process computer. The settings of parameters such as the start & stop moments of the day, the frequency of watering and the irrigation length have different influences on the water content of the substrate and, consequently, on the EC and the vegetative and generative growth of the crop.

Less emission
The hydrophillic fibres from Grodan offer easy availability and uptake of water and nutrients. The pF-curve used in soils is not a suitable parameter to measure the water contents. It is better to measure it directly with a sensor, which also measures EC and temperature. Productivity has doubled over the last ten years, and one of the reasons for this is an improved generative steering of the EC while emissions of drainage water decreased and uniformity in the slab increased. In an open system for tomatoes it was estimated that 945 kg N (nitrogen) per hectare was emitted, while in a closed system with 85% reuse and 30% drainage, only 142 kg N per hectare was emitted. Further lowering of the drainage to 15% enables a further N emission reduction to 71 kg per hectare. Although the EU Water Framework Directive currently permits an emission of 125 kg N per hectare, this will have to be reduced to below 70 kg N within a few years. Adequate watering realises only 10% direct drainage, 70% refreshment in the slab and 20% resaturation.

The right EC in the slab
More generative growth is realised by steering the EC in the slab. The time chosen to start and stop watering each day has a major influence, while the frequency and irrigation length have less impact. Growers can influence the water content and, consequently, the EC by experimenting with the irrigation schedule on the computer. Once they are familiar with the setting of the parameters, significant steps can be taken.

Conclusion
Precision growing enables growers to steer the water contents in fibrous slabs and, consequently, to manipulate EC for generative growth, production and emissions.

Partners in this HortiSeminar: Grodan, Priva
HELP... MY PLANT TALKS!

By Olaf van Kooten, Wageningen UR Horticultural Supply Chains Group

The new Priva TopCrop environmental control system provides greenhouse plants with exactly the right amount of water by controlling both climate and water dispense. Now growers can optimise their cultivation conditions and achieve considerable production increases and quality improvements.

Priva’s new TopCrop control system senses the plant’s condition which is used as the primary input for the climate computer to adjust the heating, ventilation, watering and other settings. By putting the plant directly into the control loop growers can achieve considerable improvements on production, quality and timing of their production. Over the past five years Peter Kamp, innovator at Priva, has worked on the development of this system. Professor Olaf van Kooten of Wageningen UR gave his vision on the future of new cultivation systems in horticulture and how they can fulfil a central role in greenhouse management in a market driven environment.

Research has shown that three measurements at three locations in the plant are sufficient to indicate a plant’s behaviour. Priva TopCrop therefore measures the temperature of the highest, middle and bottom leaf to a tenth of a degree, as well as air temperature and humidity at these three levels. Then a model calculation is used to determine whether the plant needs water or a change in climate conditions, and, if so, by how much.

Practical experiences

The first tests were done in three cucumber crops in the Demo Nursery (Demokwekerij) in Honselersdijk and it resulted in a production increase of 12 percent. The system was also tested in commercial greenhouses with roses, chrysanthemums, gerbera’s, callas and tomatoes. For most crops one sensor per greenhouse compartment was sufficient to optimise the water supply and climate for that greenhouse. Tests in open field with lettuce and cauliflower also showed good results.

The tomato grower who worked with TopCrop – Pieter van Dijk (Nursery De Nieuwe Dijk) - also indicated that the system has given a much better understanding of why the crop sometimes needed adjustments related to ventilation, heating or water. He also reported a reduction of botrytis in his greenhouse from 20 percent to 4 percent from the moment the system was introduced.

Speaking plants

The new approach of crop management is directly based on the needs of the plant. This leads to less drainage, fewer crop protection operations, better quality and higher yields. The system works for every type of greenhouse crop and can be optimised per crop type. TopCrop has now outgrown its test stage and will be introduced in the Netherlands in 2013. Shortly afterwards it will become available to the rest of the world.

“The new crop management system is a huge step towards a working ‘Speaking Plant’ system,” concluded Professor Van Kooten. “With increasingly precise cultivation, growers can set themselves apart from their colleagues by acquiring various specifications and certifications, allowing them to consolidate and even expand their market position. In this way, the TopCrop system makes a considerable contribution to (the development of) strong and competitive horticulture companies.”

Partner in this HortiSeminar: Priva
GLOBAL OPPORTUNITIES FOR REMOTE PRODUCTION SUPPORT

By Fokke Buwalda, Wageningen UR Greenhouse Horticulture

Investments in Dutch greenhouses and production systems are being made all around the world. Installing hardware does not in itself guarantee success, however. Much more is required. Thanks to the intensive use of internet technologies this hardware can now be delivered with crop support from the Netherlands, aided by simulation models developed by Wageningen UR Greenhouse Horticulture.

Intelligent use of internet tools enables growers worldwide to receive production support from the Netherlands. Dutch crop consultancy firm GreenQ is one of the leading players in this emerging field, already supporting scores of companies abroad. Production support is provided by means of weekly consultations via Skype, based on data downloaded from the climate computer and optional crop sensors. Production registration and crop images made by the grower on site are an essential addition.

Remote support

“Production support in other regions than the Netherlands is complex. There are many aspects involved,” according to Herbert Stolker of GreenQ. The first step is to make a production plan, in which the successful Dutch production method is adapted to fit the actual local conditions. The subsequent realisation of the production plan is a matter of monitoring, timely detection of deviations and making the necessary adjustments.

One of the companies making use of remote production support is Alexander Melnychenko’s nursery in the Ukraine. Last year, Melnychenko switched from growing roses to cultivating tomatoes and hired GreenQ for support. On-line support is provided weekly, whereas a GreenQ consultant travels to the Ukraine for an on-site visit once a month. “These visits are extremely important,” underlined Stolker. “Support via the computer alone is insufficient and it is not enough for consultants to only get data from the company. They also need to actually see and feel the situation in the greenhouse once in a while.”

Perspective

“Monitoring and simulation models are playing an increasingly important role in greenhouse horticulture via remote production management and advisory systems,” said Fokke Buwalda of Wageningen UR Greenhouse Horticulture. By providing extra information about the crop status and calculating production forecasts, models can narrow the gap between consultant and grower. Service quality increases, while the necessity of costly and time-consuming company visits abroad is reduced. During the HortiSeminar, Buwalda introduced a new online model that can link to information systems from other parties, such as GreenQ’s Greenscheduler. It is the first in a series of next-generation online models under development by Wageningen UR Greenhouse Horticulture. Interest in this new service has already been shown from India, the Middle East, several Eastern European countries and the USA.

Partner in this HortiSeminar: GreenQ
GROWING FERNS FROM TISSUE CULTURE TO THE GREENHOUSE WITH A LIGHT RECIPE

By Tom Dueck, Wageningen UR Greenhouse Horticulture

Each crop prefers a specific light environment. Together with the grower a light expert can develop a light recipe for optimal growth. By using LEDs, the grower can choose from various light characteristics and combining them can result in additional benefits to the crop. Propagating ferns in a controlled environment missed the aspect of plant hardening. By developing a light recipe for multi-layer fern propagation, plant hardening was realised with LED-lighting.

Philips Lighting and fern propagator Vitro Plus have developed a propagation and growth system for 460 m² ferns on 28.8 m². The development of a light recipe made the transition possible from tissue culture to hardened plantlets in climate rooms.

Light recipe
Each crop requires its own specific light climate. Assimilation light is used because light is a limiting factor and can easily be controlled. By varying factors like intensity, light sum, day/night, direction, distribution and light quality, it is possible to develop the optimal light environment for each crop. LEDs have the additional advantage of a low temperature, making it possible to position them very near to the crop. Together with Vitro Plus, a light recipe was developed for fern tissue culture to grow in climate rooms.

Hardening plants
A drawback of fern tissue culture with TL-lighting was the temperature, making multi-layer growth very difficult. LEDs provided an answer, allowing Vitro Plus to grow ferns with only 40 cm space between layers. It also became possible to harden the plantlets from tissue culture enabling proper growth in climate rooms. Following an initial test and analysis, a light recipe was then upscaled and fine-tuned to result in a product and application, complete with business case and financial support. Thus, by developing a light recipe for multi-layer growth, it became possible to grow 460 m² of ferns in 16 layers on only 28.8 m² floor space.

Multi-layer production under LEDs has various advantages and this concept has been proven with ferns at Vitro Plus together with Philips Lighting. Light recipes have been developed and tested for other crops as well, making them directly applicable in practice.

Partners in this HortiSeminar: Philips Lighting, Vitro Plus
EVERY SQUARE METRE COUNTS

By Erik Pekkeriet, Wageningen UR Greenhouse Horticulture

While many pot plant growers think that their greenhouses are full, this is often not the case. The question is: How full are their greenhouses really and what options exist to better utilise greenhouse space? Berg Hortimotive advocates better linked systems and a more accurate insight into orders and production planning.

BergVision is a greenhouse planning system which links and optimises processes. It has already been implemented at various pot plant companies, including Bunnik Plants and Anthura, both in Bleiswijk (NL). According to Advisor ICT Solutions, IT will become an increasingly important aspect in determining the chain.

Measurements and experiences
BergVision integrates IT systems, from machine controls, production planning and order shipments to complete ERP systems. “The system combines experiences,” Theo Willemse of Berg Hortimotive explained. “Not only sales employees can provide input for planning - their colleagues can also record measurements and experiences in the system.”

“Our employees have lots of knowledge and expertise,” Danny Fiere of Bunnik Plants continued. “This can be hard to transfer, however, which hinders optimisation. Changes can only be realised when they are well-founded, and BergVision facilitates this.”

The system analyses processes and almost always indicates that room is available in the greenhouse. “A more efficient use of space offers major opportunities,” according to Willemse. “Potential results include more profitable margins or ensuring faster delivery times with equal reliability.”

Experience in practice
Mark van de Knaap of Anthura: “We started designing a ‘Garden Utopia’. We then looked at how far we were removed from it and used the new insights to start the realisation. At the moment we have linked our order management, stock management, logistics system and plant watering. As a result, if we are planning to ship a batch by air, I can indicate that the plants should not be watered. It is important to keep on top of everything though as the system will not run itself.” Fiere van Bunnik Plants continued: “Our company also started developing a large functional design, which is extremely important. If you don’t know where you’re going, you’ll never get there.”

Eric van ’t Boveneind of IT company Advisor ICT Solutions sees the future as follows: “All systems will be linked. If a flower shop owner orders flowers online, he can immediately look into the grower’s stock. The grower, in turn, is the only one who can add information. This will increase the power of the producer and create a more direct link between consumers and producers.”

IT is helping to shorten and accelerate the chain. As a result higher delivery speeds, increased reliability, client-specific quality and the successful sale of niche products are within reach. “The BergVision system will soon also be available to smaller pot plant businesses,” Theo Willemse concluded.

Partner in this HortiSeminar: BergHortimotive
RETAILING THE BRAND

By Erik Toussaint, Wageningen UR, plant sciences

Branding in fresh produce chains is not an easy task and companies are often fearful of the costs. However, while the sector does face specific impediments, Rik Riezebos of the European Institute for Brand Management believes a good ‘branding strategies’ can offer major advantages in this industry too.

Businesses in the fresh produce chain could benefit from looking at a number of potential obstacles when choosing a brand strategy. Is the company large enough? Although you may be the largest in your market, it does not necessarily justify the application of a complete market strategy. They should also consider how much control they have over the product quality by the time it reaches consumers as poor quality runs the risk of damaging a good reputation. The fact that consumers are not especially brand sensitive to fresh produce is also reason for caution.

From the inside out

When hearing the term ‘branding strategy’ many people initially think of external factors such as the name, logo and colours. A good branding strategy, however, starts from the inside out, with the identity of the product. This is what determines the essence of the brand, and this essence should be the starting point for everything involving the product; from the purchase of raw materials and infrastructure, via the relationship with retailers to after-sales for consumers.

Results

A good branding strategy can offer many benefits. In financial terms it can translate into increased sales, lower cost prices, higher margins and a guarantee of future income. In a strategic sense it offers a competitive advantage and makes a company attractive in the labour market. From the management perspective, a good branding strategy makes it easier to penetrate new markets.

And so…

Brands like Coca Cola and Apple show that a good branding strategy can achieve much. By properly analysing the obstacles and possible results, the fresh sector can also develop effective branding strategies based on the unique identities of the products.

Partner in this HortiSeminar: Horti Alliance
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THE DO’S AND DON’TS OF REALISING A GREENHOUSE PROJECT

By Sjaak Bakker, Wageningen UR Greenhouse Horticulture

Worldwide protected cultivation can offer sustainable solutions that are suitable for ‘local for local production’. Successfully realising a new greenhouse horticulture project involves several steps. Practical examples at Rijk Zwaan and Olij Rozen illustrate the main factors for success: A clear definition of the goals of the project and adapting the system to individual demands and local preconditions.

A growing global population and the effects of urbanisation demand efficient local production of sufficient food. Protected cultivation can play an important part in this process, and the Netherlands has all the required knowledge in-house. Greenport Holland International (GHI) serves as a business portal for the Dutch horticulture sector in the international market.

Adapt to local conditions

Many recent international greenhouse horticulture projects have been unsuccessful. “The cause can often be found in insufficient preparation and the application of Dutch technology in an environment that is very different to that in the Netherlands,” Harm Maters of GHI explained. Martin Steentjes of Van der Hoeven, Horticultural Projects, and Frans van de Sande of Rijk Zwaan agree. They have learned in practice that adapting to local conditions is a key condition for the successful application of Dutch horticultural knowledge and technology.

Clear wishes

The basis for realising a successful greenhouse horticulture project anywhere in the world is a well-defined starting point: What does one want to produce and for whom? The answer will help determine the preconditions of the location regarding climate, infrastructure and the availability of factors such as energy, water and labour.

Once the preconditions have been determined, the plan should be further refined; from country to region and finally to the exact location. Using the networks of the Dutch embassy and working with reliable local partners are essential factors for acquiring the necessary licenses. After all, a good starting position determines the chance of success.

Realising turnkey solutions

When all choices have been defined, it is recommended to work with a turnkey builder and jointly design a development plan. It is also important to call in specialist cultivation knowledge from the start of the design process and when determining how to technically realise the greenhouse and work space. A specific project manager and technical expert on-site will ensure that everything goes according to plan.

A major pitfall in many previous projects was the assumption that the planned project would automatically run without any problems from the outset. It is therefore important to ensure that a local maintenance crew is present from the delivery to the end of the entire project. Following these best practices will increase the chance of Dutch horticulture projects succeeding.

Partners in this HortiSeminar: Greenport Holland International, Van der Hoeven Horticultural Projects, Rijk Zwaan
STANDING STRONG TOGETHER IN THE CENTRAL AMERICAN MARKET

By: Anne Elings, Wageningen UR Greenhouse Horticulture

NethWork is a new network consisting of 14 Dutch horticultural companies and a knowledge institute that work together to improve horticulture in Central America. A starting point is sustainability, but the companies also hope to further strengthen their mutual business relations. The network is focused on Costa Rica, Guatemala, El Salvador, Nicaragua, Honduras and Panama, and is supported by the Dutch Ministry of Economic Affairs.

The new network organisation was presented by Hans de Vette, NethWorks Chairman, during the HortiSeminar ‘Think Orange, Grow Green’, in the presence of ambassadors from Costa Rica, Nicaragua and Panama and around 100 other guests. The complementarity and joint goal of the participating companies are the strength of the new initiative, according to De Vette. Edwin Smit of IdeaWorks presented a strengths and weaknesses analysis of the Central American horticulture sector, while representatives from NL Agency and FMO addressed the subsidy possibilities.

Sustainable potted plant business

NethWork consists of 14 Dutch horticultural supply companies and HAS University of Applied Sciences, partners that complement each other and wish to enter the Central American market together. To do so, they are organising trade missions and starting up a sustainable pot plant nursery in Guatemala as a demo project.

The countries in Central America are very diverse in their possibilities and impediments, but all offer excellent horticultural opportunities. The Dutch horticultural supply companies will have to be able to switch successfully between various levels of technology. Only then will they be able to offer the most suitable solution for Central American applications. In many cases this will not be the same high level of technology that Dutch companies are used to.

Long-term cooperation

The philosophy of NethWorks is to work in closed, long-term partnerships and offer custom solutions. NethWorks is subsidised by the 2g@there programme of Agency NL, which previously financed similar horticultural programmes in regions such as Russia, Turkey, Mexico and East Africa. More information is available via www.nethwork.info.

Partner in this HortiSeminar: NethWork