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Front cover -

Cut foliage and flowers on the Evanthia stand at FloraHolland Trade Fair • See page 12

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COMMENT

News that Tesco has signed up to the NFU's Fruit and Veg Pledge is a true indication that things are changing for the better with regards to retailer and supplier relationships. Tesco now join Lidl, the Co-op and Aldi who were the first to sign up to the pledge. As part of its commitment, Tesco will promise to treat all of its suppliers fairly, in accordance to the Groceries Supply Code of Practice. It will also build long-term relationships with growers offering certainty and stability to whoever it chooses to work with. This will also mean offering production programmes as far in advance as possible of the crop being required with a commitment to purchase a proportion of the crop at a previously agreed price when it is ready to harvest. In general, it will offer greater price certainty to growers and pay all of its suppliers on time and consult with them on any changes to payment terms. This marks a significant shift to the problems witnessed less than a decade ago, with stories appearing on a regular basis about supermarkets and their treatment of suppliers. It also re-enforces the impressive work of the Groceries Code Adjudicator and the on-going commitment to the sector by the NFU.

Also the pledge will see Tesco contribute to investment in horticultural research, development and product innovation...and there lies further opportunities for UK growers. Not only will the retailer commit to increasing the proportion of UK salad crops, fruit and veg when in season but the money for research and development is exactly what the sector needs. Government investment in the sector, while increased slightly over the last few years with announcements of innovation related funding streams, has been relatively low over the last decade with the industry losing key research organisations during that time also, such as Horticulture Research International. Growers will also get the chance to grow and develop new product areas.

Industry needs to continue to find new ways of increasing interest in fresh produce to help increase consumption. The NFU has undertaken a new project to look at whether increasing the nutritional value in UK-grown produce is possible after decades of these nutrient levels falling. So, the combination of this kind of thinking, better working practices and increased commitment and investment should make a difference as we begin to plan for what the sector might look like over the next ten years.

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LATEST NEWS

'Local approach' needed for post-Brexit labour supply

Business organisations continued last month to keep the spotlight on horticulture's critical need for a stable labour supply post-Brexit. In Cornwall, research commissioned by the county council and Cornwall and the Isles of Scilly Local Enterprise Partnership (LEP) suggests that although the region relies less on workers from the EU than other parts of the UK, any move to restrict their numbers will put it at a disadvantage purely because of its location. County council leader Adam Paynter wants government to take into account the needs of specific areas, such as Cornwall, when drawing up its future migration policies.

"We are calling on the government to take a place-based approach to future migration, to make sure that the Cornish economy has access to skills which may not be highly valued in London but which are vital to a major rural economy like ours," he said. Overall the study

found limited evidence that migrant workers were directly displacing local labour, although some structural and skills gaps could be addressed in the longer term to help local people compete better in key industries in the future. 'There were also few examples of migration having an impact on wage rates, with no businesses recruiting from the EU directly because of lower costs,' it said.

The report's recommendations include a specific scheme for agri-food and seasonal workers and ensuring that lower skilled workers are part of any future migration system. The LEP's chief executive, Sandra Rothwell, said: "We cannot afford a one-size fits all solution or the continued uncertainty that has already started to blight the labour market." Members of Greater Lincolnshire LEP's food board met MPs and ministers at a House of Commons reception in November, where issues raised included labour supply. Board chairman and grower Mark Tinsley said: "Food businesses do have concerns about trade and labour supply in the light of Brexit, but we are also being proactive in embracing industry-wide challenges, such as how to reduce waste, manage water supplies and improve efficiency." John Hayes, MP for South Holland and The Deepings, said increasing food production was a top priority for the rural economy. "We should grow and make here in the UK more of what we consume," he said. "A key to this lies in innovation and new technology. Put straightforwardly, the future of farming must be less labour-intensive."

Tesco pledge

Tesco has signed up to the NFU's Fruit and Veg Pledge, committing to support British horticulture and fairness for growers and the supply chain. Amongst its commitments, the UK's biggest retailer has pledged to create long-term partnerships with its growers, offer greater price certainty to growers – for a season or on a specified volume of produce, with no unexpected or imposed changes – and plan promotional activity in advance with growers.

The pledge is a charter of best business practice that calls on retailers to back British growers and offer suppliers a fairer share of risk and reward. NFU President Meurig Raymond said: "It is fantastic news that Tesco has signed the NFU's Fruit and Veg pledge. British farmers produce the food which helps to feed the nation and it is positive to see Tesco recognise that fact, committing to values that ensure fairness for the farmer and the supply chain. "By offering this vital certainty and commitment, Tesco's suppliers of fruit and veg will be in a stronger position to invest in their business, plan for the future, boost productivity and compete in a global marketplace. By signing up to the pledge, Tesco is telling suppliers it

has started the journey of delivering ever higher standards of business integrity, which we are very proud of." Tesco join Aldi-the first to sign up to the pledge, Lidl and Co-op as the retailers who have signed up to the pledge so far.

Pioneering Dutch young plant producer dies

Herman Hamer, until earlier this year chief executive officer of the young plant supply company Florensis, and president of Fleuroselect, died on the 12th November, aged 60. He was widely known to growers of protected ornamentals in the UK, with many having met him on visits to the extensive nursery just west of Rotterdam. He took the lead role in the development of the family business, founded as Hamer Flower Seeds by his father in 1941. In addition to his work within the business, Herman Hamer was involved with Fleuroselect from the 1980's onwards. He joined the board of directors in 2003, and was elected president in 2015.

Taking responsibility for sustainability

Klasmann-Deilmann has presented its 2016 Sustainability Report, a publication in which the company regularly provides information about key developments in nature conservation and climate protection, the use of resources and the sustainability management targets specified by the Group. "We take our corporate responsibility for ecology, economy and social issues very seriously and are continuously working to achieve further improvements in many areas," says Managing Director Norbert Siebels. "Our Sustainability Report ensures the necessary transparency in our dialogue with the public." Over the last few decades, for instance, Klasmann-Deilmann has re-waterlogged and afforested more than 8000 hectares of former peat production sites or prepared them for agricultural after-use. More than 3800 hectares of that area are now natural habitats which permanently promote nature conservation and climate protection," he adds.

Active peat extraction sites are increasingly subject to additional voluntary self-imposed obligations which go further than the requirements specified by the authorities. An important factor in that context is the independent certification system "Responsibly Produced Peat" (RPP), which prescribes strict standards for the selection, use and restoration of production sites. "70 % of our total production volume will already be certified to RPP standards by the end of 2017," says Siebels. "That is good news, because the RPP certificate gives our commercial horticultural customers the certainty that our substrates are made from responsibly produced raw materials." The figures on the company's carbon footprint also considered a study commissioned by Klasmann-Deilmann in which the emissions on peat production sites were measured in accordance with scientific criteria over a period of two years.

New grants to encourage robotics and LEDs

Grant aid to encourage investment by growers in new technologies including robotics, LED lighting and energy efficiency is now available under the RDPE Countryside Productivity Scheme, administered by the Rural Payments Agency. The minimum funding available is £35,000 and the maximum is £1 million per project to cover up to 40% of its total cost. The investment should be designed to use new technology to improve productivity, make the business more resilient or efficient, create new jobs or increase turnover or profitability. Jon Swain, senior consultant at FEC Energy, said the grants were welcome to help support investment for the future and to improve the business case for a new project. "They are most likely to be used by growers for investments in automation, particularly in the ornamentals sector for tasks such as pot spacing, and for new energy-saving and energy infrastructure technologies. "Our understanding is that the scheme is intended to support novel technology, so, for example, while a standard thermal screen probably wouldn't qualify, double screens being installed to enable a grower to take up 'next generation growing' would."

Equipment that helps growers increase their use of renewables by improving energy storage, using batteries for example, or by distributing energy more efficiently around a holding would also be eligible. The deadline for applications is December 3, 2018, and projects must be complete by the end of 2020. A second new grant is intended to aid investments in processing to shorten supply chains to benefit growers. It includes equipment or machinery, or constructing or improving buildings associated with processing, such as grading and packing facilities. The application deadline is June 29. For details, visit gov.uk/guidance/countryside-productivity-scheme or call Defra's RPA helpline on 03000 200 301.

Top varieties – England & Germany

The Cheshire-bred begonia Orangedrops was among the highest scorers in the ballot for the 2017 MainStar Award in Bavaria this summer. Voters were German growers and trade professionals – over five hundred of them – attending the annual bedding and balcony plants conference in Germany's largest state, which has a population of almost thirteen million. Begonia Orangedrops, introduced in 2014, was bred by Dennis Need, who has a track record established over thirty

years, with varieties such as Buffey and Peardrop among other successes. Marketed in the UK by Vale Royal Horticultural, Orangedrops was entered for the MainStar Award competition for the best bedding and balcony plant by Begonien Rieger, a long-established German specialist business.



Begonia Orangedrops.

Deadlines announced for trickle licences

Applications for licences for abstracting water for trickle or drip irrigation in England and Wales will open in January.

Making the announcement, Defra said that although growers affected by this change to abstraction licensing will have two years to apply, they shouldn't leave it to the last minute because it won't give the regulators, the Environment Agency and Natural Resources Wales, enough time to make their necessary checks. The length of the period over which growers can demonstrate their historic use of water for this method of irrigation, to support their applications, has been extended from the four years originally proposed to seven, to include the dry season of 2011. "If abstractors have concerns about what evidence can be used, the quality of the evidence available, or the potential impacts on current business activities, we strongly recommend speaking to the regulator to discuss the concerns as early as possible in the two-year application period," it says. Nursery stock consultant John Adlam of Dove Associates said it was key to provide as much evidence as you can to justify

the amount you're asking for in terms of daily or annual amounts. Ideally, this would be based on meter readings but because there has been no requirement to keep such records for trickle or drip irrigation, some growers won't have collected this body of evidence. "If you don't have such records, there are other ways [to demonstrate use], such as figures for the number of drippers, water flow rate, hours of operation, size of pumps and so on," he said. "I understand that the Environment Agency will accept evidence such as photographs of your irrigation system and invoices showing details of pumps – they do appear to want to be flexible." He added: "You do need to be as accurate as possible in your assessment of your needs, and while you need to ask for a volume that would be sufficient in a dry year, don't go over the top." All applications will be determined by the end of 2022. "Potentially, you have up to five years to look at possible ways to mitigate against not getting the volume you asked for – such as rainwater harvesting and reservoirs," he said. Grants for reservoirs are currently offered under the RDPE Countryside Productivity Scheme. The threshold below which growers still won't need a licence remains at 20cu m per day. "That's enough for a small protected ornamentals nursery of around 1ha, assuming you can store all that you abstract in winter," said Mr Adlam.

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Construction has been completed on Thanet Earth's sixth glasshouse—a dedicated 7ha area that will focus on all-year-round speciality tomato production. The new greenhouse is now fully operational, planted with four different varieties of speciality tomato, including the signature Thanet Earth Piccolo variety. Heated by Combined Heat & Power technology, the greenhouse is fitted throughout with High Pressure Sodium (HPS) growlights, the secret to ensuring year round production. Thanet Earth now accounts for 15% of the planted area for tomatoes in the UK. In reality, the hyper-efficiency of the growing system and the 12-month harvest capability mean that the percentage of UK tomatoes grown at Thanet Earth is approaching 25%. During the winter months, the total 31 hectares of lit production at Thanet Earth is representing 75% of the UK's total capacity of lit tomatoes. In what is believed to be a UK first, Thanet Earth has installed sodium growlights in a cucumber glasshouse too. This glasshouse was constructed in 2016 and has hosted a crop of tomatoes through the 2017 season. It will switch to cucumber production for 2018 with the young plants assisted through the winter months by supplementary lighting. According to the company, this is the first UK high wire, light-assisted cucumber crop.

Tackling lettuce disease

AHDB has commissioned work on lettuce fusarium wilt following the first confirmed outbreak of the disease in the UK, on a soil-grown protected lettuce crop in Lancashire. It was also recently found on a crop in Ireland.

The UK outbreak, reported in October, has been confirmed as race 4 of *Fusarium oxysporum* f.sp. *lactucae*, the particularly aggressive strain that has been causing problems for growers in Belgium and the Netherlands for the past three years. The origin of the UK outbreak remains unknown but information published by AHDB suggests it can be carried on symptomless young plants. Research in Italy indicates that it can also be seed borne though the extent to which this may be a factor in commercial production is not known. The disease can be transmitted in water, too, so hydroponic crops are potentially at risk, if young plants are already infected. No fungicides currently available are effective against it and no varieties are resistant, though at least two seed companies are believed to be breeding for it. AHDB crop protection scientist Kim Parker said that although the soil-borne disease could affect both outdoor and protected lettuce, its requirement for relatively high temperatures means that in the UK the main impact would be on crops under glass, should it become established here. "It has become a problem under glass in the Netherlands," she said. "The spores can survive for several years in soil. Growers in the Netherlands have either had to move to new glass or restrict themselves to winter production only, when the pathogen is less active." AHDB has commissioned Warwick Crop Centre pathologist Andrew Taylor to undertake a review of all known information about the disease. His report is due in February but any information he finds that could be of immediate use to growers will be published as it arises, she added. As part of a wider existing AHDB project on fusarium diseases, Warwick Crop Centre will be accepting samples from lettuce crops with suspect wilt symptoms for free testing. Initial symptoms include leaf yellowing and wilting with reddish-brown necrosis to internal tissues of upper roots and crowns but these can sometimes be confused with other diseases such as *Pythium tracheiphilum*. "We are advising growers that avoidance is the best strategy," said Dr Parker. "Growers should review their hygiene measures on the nursery and with their plant propagator to avoid the disease getting onto their sites." Propagators should check with suppliers whether seed has been cleaned and to request seed-testing results. Trays should be treated, as the disease can be transmitted in any soil and debris they carry, and steps taken to cut the risk of spread on tools, equipment and footwear.

AHDB is organising a meeting in Lancashire on December 14, where ADAS associate plant pathologist Tim O'Neill will discuss practical measures to reduce the risk and impact of the disease.

Nick Field joins CMW

CMW are pleased to announce that Nick Field has joined the company. With more than 25 years experience, both in the UK and internationally, Nick is already very well-known and highly respected in the protected cropping and soft fruit sectors of the horticulture industry. CMW are one of the UK's leading Priva dealers and are confident that Nick's considerable expertise in all aspects of climate and irrigation control, digital labour registration, digital crop registration as well as technical and heating systems generally will further enhance CMW's ability to provide the best in technical and sales support to both new and existing customers.



Nick Field.

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INVESTMENT SET TO CONTINUE IN GLASSHOUSE SECTOR

Both suppliers and growers are reporting an upturn in investment in the last few years as businesses continue with development plans despite a range of new challenges. Adrian Tatum reports.

Two years ago a report by the NFU revealed worrying figures relating to the UK's self-sufficiency in food. It found that the UK will only produce enough food to feed 53% of the population by 2045. This, according to NFU President, Meurig Raymond, highlighted a decline in self-sufficiency, caused by factors which included shifting and conflicting direction in European and UK farm policies, the legacy of underinvestment in publicly funded research and development and poorly crafted regulation.

Responding to the report, NFU Deputy President, Minette Batters said: "The important thing to remember about self-sufficiency is that it is a yardstick for measuring how competitive we are and how much we produce. It doesn't mean limiting or reducing export; it means capitalising on what we are already good at and being able to provide Great British Food to shoppers and food procurers throughout Britain. We know 85% of the public have said they want to see more British food on the shelves. In a volatile world, it's really important for a small island nation to prioritise food security."

Since then, the Government is starting to address food security issues and encourage more domestic production by implementing a number of measures. However Brexit, a rise in labour costs and the availability of labour has promoted more uncertainty. Despite this, the last few years has seen an upturn in investment in the glasshouse sector as growers look to continue to invest to become more efficient and reduce costs as well as raise the quality of the crops they produce.

There has also been an upturn in profitability for some. The protected edible glasshouse sector increased its output by 18% during the 2015/16 season with profitability remaining 'relatively stable' according to the latest Farm Business Survey by the University of Reading's Rural Business Research unit.

The survey said that profitability averaged out at approximately £25,000 per business. For farms specialising in salad production, the average was slightly higher at £29,000 per business on a turnover of more than

£350,000. However, it also said that the increase in output at 18% was countered by a 'significant rise to costs' especially relating to labour and seeds.

It was also reported that the area of protected vegetables has increased by 27% since 2007 with output rising from 687ha to 818ha, delivering an increase of 19%. Protected vegetables, grown in both heated and cold glasshouses and polytunnels now accounted for 31% of the total vegetable value and 13% of the total value of horticultural produce. The profitability of production of horticulture businesses across the whole industry increased by 9% in 2016, an average of £34,350 per business.

This has certainly been reflected in the level of investment in the glasshouse sector. Recently, Pas Milazzo, Director of UK Salads told The Commercial Greenhouse Grower that he was spending upwards of a million pounds a year investing in his business to help drive efficiencies. Like all glasshouse growers, UK Salads has worked with the philosophy that it has to invest to survive. "We are investing in a big way - over £1 million a year - and obviously much more in the years when we have built new glass," he said. "We have to invest to be efficient and to ensure we build a sustainable future." But he also warned the uncertainty around Brexit could mean that the level of investment might be put on hold.

Last year saw the opening of a new £10 million glasshouse at Valley Grown Nurseries. Also based in the Lea Valley, the company says investment was crucial if it was to continue to develop in the future. Valley Grown worked with companies such as Bom and Bogaerts to construct one of the country's largest and most efficient glasshouses.

In the West Sussex region, home to some of the largest glasshouse producers in the UK including the Langmead Group, Madestein UK, Tangmere Airfield Nurseries and suppliers such as Fargro and Farplants, investment has been significant over the last few years. "Generally, the medium to large growers in the region have invested heavily over the last few years including a series of multi-million pound projects in their nurseries," says John Hall, consultant to West Sussex Growers Association's (WSGA) Executive Committee.

But with the uncertainty, is investment likely to continue over the next few years? "Despite the challenges and uncertainty of Brexit bringing a certain degree of



Thanet Earth's fifth glasshouse.

hesitancy, there is an underlying optimism for the future, especially with the Government's renewed commitment to food, plant and energy security, which will see an increase in domestic production. For that to be successful, growers need to continue to invest to be more efficient and increase their yields," says Mr Hall. He says a focus on energy saving and efficiencies has led WSGA members to invest in the areas of new LED lighting, anaerobic digestion and CHP systems as well as other energy saving products.

Ian Metcalfe, Director at CMW Horticulture, confirms that the last two or three years have seen an upturn in investment in the glasshouse sector. "There has certainly been more investment in the last two to three years compared to the last decade as growers look to drive efficiencies and become more effective at what they do. It has been proven that the growers who do invest continue to do well," he tells *The Commercial Greenhouse Grower*. "In the future the main drivers will continue to be energy, labour, crop quality and automation. We have seen interest this year in crop registration systems, such as the Priva FS system and also recirculation systems as growers aim to keep up with water legislation and become more efficient with their usage," says Mr Metcalfe. CMW Horticulture offer bespoke hydroponic recirculation systems where growers can make use of pasteurisation, UV or slow sand alternatives. "We have also had a number of enquires relating to new glasshouse projects and that is very encouraging for the sector," Mr Metcalfe adds. As well as Priva, the company's partners include glasshouse specialist, Certhon as well as Ridder, Ludvig Svensson and Logiqs.

Recently, CMW horticulture have been involved in 'revitalising' the Scottish tomato sector after its work with Certhon in Scotland with tomato grower Jim Shanks at Standhill Farm. Its tomato nursery was built after initial research work and investment on the family's dairy farm which included the installation of an anaerobic digestion plant to help recycle farm waste and create biogas to fuel

a CHP system to generate electricity for the dairy farm. To ensure its new glasshouse is as efficient as it could be, Certhon and CMW supplied and installed everything required for a long season tomato crop: the glasshouse, heating, screens, irrigation and water treatment, ready for planting in January 2017.

Elsewhere tomato grower R&L Holt has reported success from recent investments in the last few years. The company invested in new glass in 2014 at its Sandylands nursery as well as being one of the first companies in the sector to use LED inter-lighting as well as diffused glass. The LED lighting has enabled R&L Holt to grow virtually all-year-round and supply its customers with UK crops during the winter months. "Our new glasshouse block has meant we can spend approximately 25% less on energy costs compared to our old glass," says Roly Holt, Director at R&L Holt. He adds; "The combination of the new LED's and diffused glass means we have been able to increase productivity by approximately 20% compared to the old glass as well." This year has seen the installation of a new biomass boiler which uses 2.7 MW steam driven boilers to heat the glasshouse - another investment that will see the company make further energy savings. And that will be the focus for the future. "Our investments will continue to be focused on energy savings, because at the moment that is the only thing we can control with labour costs continuing to rise," says Mr Holt. He adds that there are further plans supported by marketing partners Evesham Vale Growers, for new glass in the future to help with the company's plans to produce more crop during the winter months. "It is still an ambition of ours to produce more in the winter because there are still relatively few UK growers doing it," he says.

But it isn't always products, services and concepts that drive investment. Langmead Herbs, part of the Langmead Group, announced last year that its success, which included a 50% annual growth, was down to its investment in people. The company said that staff feel that acquiring a number of new skills is helping drive improved productivity. The investment in staff has seen production line workers earn promotion to senior management and staff numbers are up 15% thanks to a recent campaign to support and sustain the company's 50% growth. "People development is a major contributor to this success and will prime Langmead for future growth," says Langmead Chief Executive, Ian Summerfield. Staff retention rates are high, with 57% of the 60-strong workforce having service longer than three years and with 20% longer than five years. Improved productivity also comes from Langmead's investment in the LEAN manufacturing ethos. This enables staff to question and challenge and suggest new ways of operating. In just three months of using LEAN, a 50% increase in production was witnessed on its herb packing lines.

COULD GROWERS BENEFIT FROM ENERGY STORAGE?

Increasing complexity and the use of embedded and renewable generation in the UK's electricity network means that the National Grid is looking at ever more ingenious ways to balance supply and demand. One of these is energy storage using batteries and other devices. Could this represent an opportunity for growers to profit from existing grid connections, and what other 'tools' are available for those who generate or use energy to help balance supply and demand and be rewarded for it?

This was a main topic of discussion at a recent GrowSave workshop held in Kenilworth ahead of this year's Tomato Growers Association Conference. "As growers you probably do some energy storage already," said Jon Swain of FEC Energy, who led the proceedings. "Today's event is more about telling you where things are moving to: battery storage has been a topic that a lot of people have been talking about over the last 6-8 months, and we have seen more changes in the energy market in the last couple of years than there have ever been before."

He also pointed out that while battery storage of energy is currently being hyped as the next big thing, batteries are not new and have in fact been around for approximately 150 years: "Conceptually there is no difference from the batteries that run your torch or your mobile phone. The difference is the scale and speculators are now looking for sites to put them and things are moving fairly quickly. The speed of deployment is likely to out-accelerate the Renewable Heat Incentive (RHI) and the early days of the Feed-in-Tariff (FIT)."

Jon recently visited one of the first battery storage facilities at a site in Somerset. The exact location is being kept secret to prevent an influx of so-called 'Tesla Spotters.' The site, developed by Open Energi and Camborne Energy Storage in September 2016 uses a 500kWh, 250kVA Tesla Powerpack to enable it to provide balancing services to National Grid, known as Frequency Response Support. The Powerpack consists of seven white boxes; five Li-Ion batteries, an inverter and a control box, with the batteries responding in real time to fluctuations in the frequency of the grid (which has an ideal frequency of 50Hz), either charging or discharging to balance the network. In return the grid operator pays a service charge to the owner of the installation.



Tim Pratt.



Oli Coe.

Camborne Energy Storage (CES) has plans for many of these units, which take up very little physical space, claiming it had sites for around 50 MW of capacity ready for construction. "We have ambitious deployment targets for energy storage in the UK and this successful project is an exciting step forward for us and the industry," says CES Managing Director Dan Taylor. "It demonstrates the vital role of energy storage in delivering secure, low carbon power to the UK. We are aiming to co-locate further energy storage with renewable generation throughout the UK and help make our electricity system fit for the future."

Jon explained that, energy storage can also be combined with local generation for onsite storage, for example to support PV generation by storing energy until it is used, but this will be set up differently. "The key is really the grid connection, and don't forget that you may need both an import and export requirement. Going forward the technology may be different and the set-up and economics will therefore also be different, but currently the economics don't work as an investment," he added. "You need to make sure that the economics work for you in your particular circumstances and keep an eye on policy changes as it is a fast moving market."

To illustrate the current economics Jon presented figures suggesting that, based on current energy prices, revenues from such a source alone would be in the region of £5,500 per year, nowhere near enough to cover an expensive Li-Ion battery system costing £300-400,000 with an anticipated working life of around 10 years. However, when other grid services like Frequency Response Support and contracting to the Capacity Market are

combined, some developers believe they can achieve system payback in seven years or less.

Even if electrical energy storage is not an economically viable option for growers at the moment there may be other ways of making the electrical grid work better for horticultural businesses. FEC Energy's Tim Pratt provided a whirlwind tour of the different mechanisms and payment systems including TRIAD periods (which have recently been reviewed and axed by the regulator), Short Term Operating Reserve (STOR), and the Capacity Market. Some of these sources of income can be combined (known as stacking) while others can't. "There are many opportunities to provide grid services, but no easy or obvious ones," Tim explained. In the short term he believes that flexible purchasing and use, for example getting paid to reduce consumption at times of heavy grid demand are likely to provide better savings for growers. "Flexible electricity purchasing is only available for half-hourly metered supplies," he added.

Of course there is more to energy than electricity and Oli Coe of FEC Energy pointed out that most current heat systems will have some form of thermal storage incorporated into them. "Heat storage is certainly nothing new to commercial greenhouse owners," he began. "The regular use of alternative energy systems, such as biomass, in horticulture, together with the use of the by-products of heat production such as CO₂, means it is increasingly important that heat storage is used to its maximum effectiveness."

Some of the benefits of heat storage include allowing a degree of redundancy in systems, particularly those with multiple boilers, for maintenance, servicing or coping with breakdowns. It can act as a buffer and provide flexibility in boiler sizing and in many cases (particularly with biomass systems) overcomes the mismatch between heat demand and heat production for maximum efficiency. It is also essential to allow the use of both heat and CO₂ when required.

"How much heat storage do you need?" he asked. "An old rule of thumb used to be 200 cubic meters per hectare for salad crops, while for operation of a biomass boiler you typically need more than 50 cubic meters per megawatt of installed capacity." However, he added that there are a huge number of other factors to consider, including the technology used (such as biomass or CHP), the peak CO₂ requirement, glasshouse efficiency and crop growing conditions.

"Ideally you will achieve a temperature of 90 deg. C from your boiler or CHP, although this could be potentially higher. At the other end, you want to be reducing your return temperature to the heat store to 45 deg C, using practically all the heat available to you." Using a 5 ha nursery as an example, Oli demonstrated how temperature difference affected the size of heat store



Some of the first Tesla Powerpack batteries in the UK have been installed in Somerset.

required. "If your system is returning water at a higher temperature than is necessary, or you have a boiler that perhaps isn't performing, you can cost yourself masses of heat storage," he added. With a 90 deg. C flow and 45 deg. C return, the example nursery would require around 500 cu m of heat storage. However, reducing the difference between output and return temperatures to just 25 deg. C would increase the amount of heat storage required to around 900 cu m.

He cited one nursery which had been struggling to achieve the necessary temperature difference. Following work by FEC Energy and some small changes to the heating system costing around £10,000 better flow and return temperatures were achieved and the amount of heat storage available increased by around a third using the same storage tanks.

"The most efficient way to run a biomass boiler is to run at maximum capacity for an extended period of time, rather than on the heat demand of the greenhouse," he pointed out. "Using a heat store means that it will be operating at maximum efficiency as far as biomass conversion is concerned. A similar principle applies to gas boilers, which can either be run flat out or modulated to match CO₂ demand."

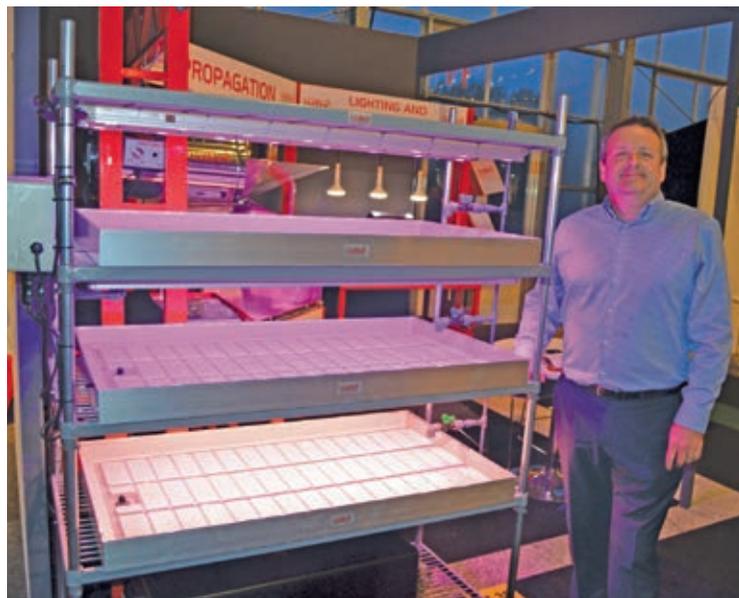
He also discussed the benefits of using heat storage with CHP units, which, if done well, can allow a nursery to increase in size compared to a gas boiler, without the need for additional heat storage, as well as how heat pumps can be incorporated into systems. "As a result of the low grade heat produced, they are often used as the pre-heat for a boiler or gas engine," he explained. "Alternatively it could be connected to its own heat store which can then be used for grow pipe heating. Renewable Heat Incentive rates are still good on heat pumps; however, if your heat store is struggling to get below 40-45 degrees then you will need to look at your heating system first.

"You should always look to increase the system efficiency before installing additional heat storage he stressed."

AUTUMN ACROSS THE NORTH SEA

Through the entrances of the Netherlands' two great autumn floricultural shows, more than 40,000 visitors passed last month. Over nine hundred exhibitors awaited them. The visitors came from every continent, and very many of them – possibly most – visited both shows, located only 25km from one another and with a high-frequency shuttle bus service between the two.

The eight-year-old International Floriculture & Horticulture Trade Fair (IFTF) this year occupied 24,000sq. m. of floor space, even larger than last year and almost double the original area. The event is international indeed. The geographical spread of the exhibitors can be gauged from just the first five and the last five of the hundred-plus pages of the show catalogue. In these ten pages there are



Noel O'Leary with the new Hotbox International product, the Grow Trolley.



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companies from South Africa, Kenya, Columbia, Ecuador, Peru, Italy, Germany, the USA, and Belgium. There were exhibitors, too, from Japan, South Korea, Hong Kong, India, Ethiopia, Israel, and even Iran. Of course, many companies from the Netherlands were there as well, and overall accounted for about 40% of the total.

The UK's representation was by just one company, Hotbox International. As an exhibitor, it is among those who were in at the start, in 2010, and has participated every year since. The company's Noel O'Leary, again pleased with the number of enquiries and leads, commented that it had always been a very well-run event, and each year became a little better still. The new Hotbox Grow Trolley, a modular propagating unit, had been attracting strong interest on the stand.

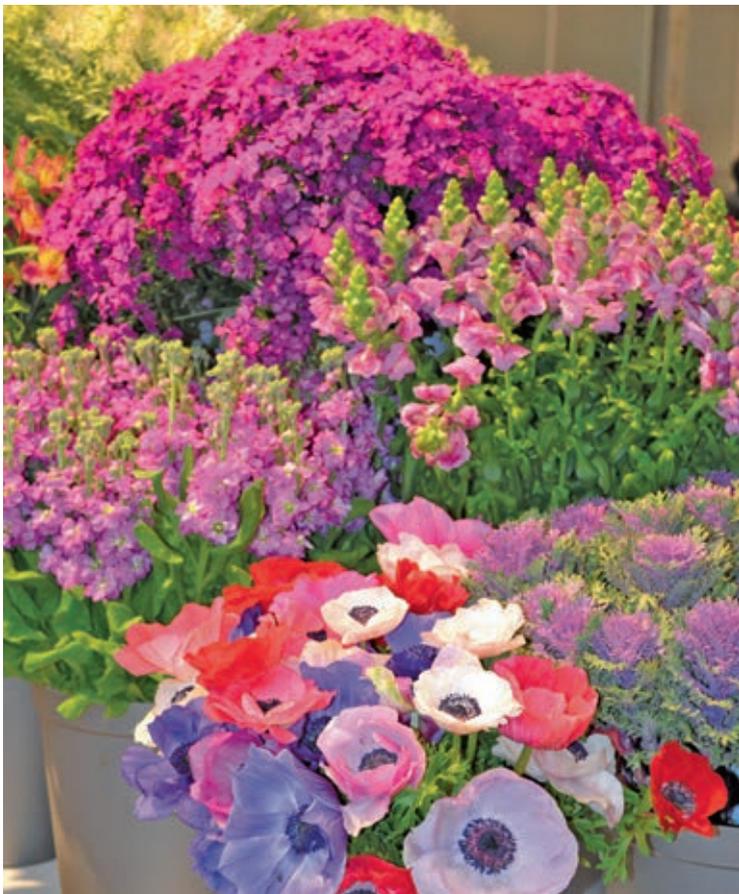
An IFTF exhibitor of past years from the UK is David Austen roses. The company's presence continued this year through Kenyan exhibitor Tambuzi Ltd. This company's specialization is scented cut roses, and it is the exclusive producer of David Austen scented varieties for the cut flower trade. This year's IFTF visitors came from 114 countries. The total number topped 27,000, establishing a new record, with a third of them coming from outside the Netherlands.

Aalsmeer Show

The visitors' footfall at the Royal FloraHolland Trade Fair at Aalsmeer was also very international, but the exhibitor profile was very different indeed. Over ninety-five percent of the almost seven hundred exhibitors were Dutch, with Denmark otherwise the only country whose exhibitor count was in double figures.

The reason for the difference lie in the history and objectives of the two shows, the one as spectacular as the other. The Aalsmeer Trade Fair was launched in 2004 to provide a shop window for the hundreds of growers who supply the giant Royal FloraHolland auction market with flowers and plants. The great majority of these producers are Dutch, and at the Trade Fair otherwise only Danish and Belgian members have a presence. The show has grown prodigiously over the years, and this year attracted 16,000 visitors, matching the record footfall of 2016.

Recent expansions of floor space have allowed diversification. Now, in addition to the large core of growers, the companies that in turn supply them occupy a considerable area. These suppliers include a substantial number that are not Dutch – for example the German breeders and propagators Selecta-one and Dümme Orange, Danziger from Israel, Prudac and cyclamen specialists Morel, both from France, lavender specialists Butterfly Garden and campanula specialists PKM from



Anemone Mona Lisa and other seed-raised cut flowers on the Ball/ PanAmerican Seed stand.

Denmark, and Bock Bio Science from Germany. Unsurprisingly, among plant suppliers at a Dutch show, Dutch companies do predominate. They ranged from specialist companies such as Wetering Potlilium, Florist Holland, for gerbera, and ABZ Seeds, for strawberries, to Beekenkamp Plants, Evanthia, Florensis, MNP flowers, Royal Van Zanten and Schneider Young Plants.

The Aalsmeer Trade Fair is very much indeed about plants and cut flowers, but does also feature exhibitors of packaging, such as the Van Dillewijn Group, pot, tray and container specialists Poppelmann and Desch Plantpak, and three pottery companies. Chrysal is a company name known to all cut flower producers and florists.

The cover of the Aalsmeer Fair's catalogue this year bore the slogan 'Welcome to the Green Age! 'Sustainability is a condition of healthy growth in our industry' is a statement in the catalogue introduction, and was the theme of this year's event. More than a third of the exhibitors at the show had MPS-GAP accreditation, signalling the producer's standards of sustainable practices and environmental and social responsibility. Their stands were marked out by a distinctive 'Green Walk' floor tile. MPS activity responds to the increasing sustainability concerns of retailers, themselves driven by consumer pressures.

Cut flowers

From the UK perspective, with its massive imports of cut flowers, IFTF is a draw for their buyers. Roses are hugely represented by producers and breeders,



Eryngium Electric and Hypericum Hipster Red on the stand of Dümme Orange.

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Getting the message out on Phalaenopsis, on the Piet Vijverberg stand.

with an abundance too of chrysanthemums, carnations, lilies, alstroemeria, lisianthus, gypsophila and much more. The largest single exhibitor category is Flower Grower/Exporter – almost ninety of them. Help in moving your product is easy to find if you need it. Fourteen companies operating in this field exhibited at the show, and included some very big fish – Air France, Lufthansa and Kuehne

& Nagel among them. For UK's cut flower growers, like visitor Roger Lamb of Lamb's Flowers in Spalding, the most powerful reason for coming to the show is the production technology sector. IFTF exhibitors cover the entire field of growers' needs here, from providing the glasshouses themselves onwards. Debets Schalke, a specialist in turnkey greenhouse projects, has completed over a thousand of them worldwide in the thirty-odd years since the company's launch. It installs both new and high quality used houses. Recently Debets-Schalke has been undertaking installations in Hungary, Ukraine and the Middle East, and looks forward to working again in the UK in the near future.

Other technology exhibitors with a presence in the British market include Philips Horticulture LED Solutions, Koppert Biological Systems, screen specialists Ludvig Svensson, Mardenkro and MeeGaa Substrates, whose

offer includes a range of coir products. Bercomex is a big name internationally in the field of automation and mechanization in flower harvesting, grading, bunching and packaging, and their equipment is doing service for growers in Eastern England. The German company Stelzner/Pronova specialises in testing equipment for soil, nutrient solutions, water and air. And Hortus Supplies International, offering a wide range of products and services, was this year foregrounding two Supramino products, a natural plant strengthener for foliar application and a liquid soil conditioner.

There were many exhibitors in the Breeder & Propagator categories. German fuchsia and chrysanthemum specialist Brandkamp was there, highlighting new 'mum varieties for pot culture. Exhibitors Konst and Royal Van Zanten are familiar to UK growers of both pot and cut flower alstroemeria. Seed-raised cut flowers featured on the stands of Takii Europe and of Ball/ PanAmerican Seed/ Florensis. Among other familiar exhibitor names were Danziger and GASA Young Plants.



One of the colours in the Rose Lily series, cut flower category winner of the 2017 Golden Tulip Award



Chrysanthemums with a difference on the stand of Brandkamp.



Cut foliage and flowers with a difference on the Evanthia stand.

THE SHOWS IN 2018

Next year's dates for IFTF and the Royal FloraHolland Trade Fair are Wednesday 7th to Friday 9th November.

For growers with cyclamen interest, the world's four leading breeders of the plant welcome visitors to their trials in Holland in the same week as the two shows. The four are Morel, Schoneveld Breeding, Syngenta and Varinova.

The trade fair locations are both within a very short distance of Schiphol airport. If you travel by car, parking is free at both events. For anyone wanting to take the opportunity of staying in Amsterdam, the free shuttle bus service between the two shows is complemented by another, between the centre of the city and IFTF.



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BRITISH VISITORS

What brings visitors from the UK to these two shows? Certainly the numbers from the production sector are not large, but even so IFTF saw over 900 British visitors. Buyers, particularly from the major supermarkets and the garden centre sector, will have accounted for some of this total, and the event is also a big draw for florists.

Some visitors are both growers and buyers, of course. An example was Jonathan Brown, sales manager for Barnsfold Nurseries in Sussex, who was accompanied by a major customer. They were on a quest for products to enhance their Christmas offer. Jonathan was at the Aalsmeer event for the second year running, and was again well pleased by the outcome. There is of course a full range of mainstream cut flower and pot plant products at the FloraHolland Fair. And for anyone seeking something different, there is an almost startling diversity available. Among the 600-plus growers there are to be found ones specialising in – for example – grasses, bonsai, king-sized specimen exotic foliage plants, amaryllis, nerine, bougainvillea and pot-grown ornamental edibles – tomatoes, peppers, chillies and aubergines.

For many UK growers of ornamentals, one good reason at the present time to visit these two Dutch shows is to watch for opportunities for import substitution. In the past, for example, there has been significant British production of pot gerbera and some production of kalanchoe. Dutch and Danish competition made this unprofitable. This might well continue to be the case, but the Brexit-related fall in the exchange rate of the £ against the € and the US\$, and perhaps further changes in the same direction in the future, may well open up possibilities that were hard to conceive before the referendum. And any grower who exhibits his own products at the National Plant Show or at Four Oaks should make at least an occasional autumn pilgrimage to Aalsmeer. There they will see how Dutch growers set about the task of making an impact. While the best of ours does as well as the best of theirs, visitors can hardly fail to learn something valuable.



Petunia Baby Doll on the Selecta-one stand.

SUCCESSOR TO SCEPTR MAKES PROMISING START ON PROTECTED EDIBLES

The original SCEPTR project (Sustainable Crop & Environment Protection – Targeted Research for Edibles) run by AHDB Horticulture finished at the end of 2014, after four years of trials which helped highlight a number of potential new crop protection options across a range of crops.

With a number of them since becoming commercially available, a number of people have wondered whether the project would be continued. A recent Industry Open Day held at Stockbridge Technology Centre (STC) gave growers and agronomists one of the first chances to view the scope of the new SCEPTRplus project, as well as viewing some of the trials on protected edible crops first hand.

“We need interaction [with industry] on SCEPTRplus,” stressed AHDB’s Head of Horticulture Knowledge Exchange Debbie Wilson. “We can set the trials up and run them, but we need feedback.”

This sentiment was echoed by Dr David George of Stockbridge Technology Centre in his introduction to the Selby-based research facility which dates back to 1949 and has been operating in its current independent guise since 2001. “This is a great opportunity to get industry feedback,” he said. “We are doing the protected edibles work for SCEPTRplus. We are not just doing product screening, but we are also involved in other IPM projects for AHDB.” Some of these include looking at how pests and diseases respond to light. “We’ve found some very interesting results,” he added. “If we can manipulate light then we can manipulate pests, diseases and biological control agents.”

SCEPTRplus is being led by AHDB Horticulture’s Joe Martin, who, like his colleagues, also emphasised how important knowledge exchange is to the project. The priorities for the project are determined by discussion with a steering group which includes representatives of each of the main crop panels, including Hardy Nursery Stock and Protected Ornamentals, Bulbs and Outdoor Flowers as well as Edible Crops. The results and current status of trials are being communicated by a number of methods, including open days for crops including carrots and rhubarb, as well as blogs on issues such as Western Flower Thrips and presentations at other industry events.



AHDB Horticulture Crop Protection Scientist Joe Martin heads up the SCEPTREplus project.

The Steering Group is now starting to discuss priorities for the second year of work, with the final decisions due to be made in December. “The priorities are discussed with grower associations, and we also liaise with agrochemical manufacturers to see what they might have coming through,” explained Joe. “Some sectors will say that everything is a high priority, but we have adopted a model crop approach which allows us to get a quick look at potential uses.” Trials are planned by a group which is chaired by Ed Moorhouse and which comprises STC, East Malling, ADAS and Warwick Crop Centre. “Being able to work with IPM is going to be more and more important,” he added, so the design of trials and choice of products is also reflecting this.

Two of this year’s SCEPTREplus trials have been looking at the control of cucumber root rot (*Pythium aphanidermatum*) and lettuce downy mildew (*Bremia lactucae*), with the latter being chosen as one of the model crop/disease combinations for the project. The results to date were presented by STC pathologist Kirsty Wright. She explained how the number of potential products for controlling these diseases (including biological options) had been reduced to a number which could be included in the trials. One thing that had been learnt from the previous SCEPTRE project was that a higher number of trial replicates is needed to provide robust data for assessing biological products which can be more variable than conventional chemicals. Therefore, SCEPTREplus includes six replicates of all treatments to overcome this. “We are focusing on materials that have a clear route to market and we are not testing anything that was included in the original SCEPTRE trials,” she added.

The lettuce trial had been harvested the week before the

open day (held on 19 October), and one conventional treatment had performed particularly well against the disease. However, Kirsty remarked that it had left a residue on the leaves following application, which may be a problem. Another product had shown signs of phytotoxicity, while an EAMU is currently being applied for on another product which had previously shown good results against mildew on basil.

Pythium root rot on cucumbers is classed as a high priority by many growers, and so there has been a lot of interest in this particular trial, although choosing an application rate for many of the products, which are not currently approved for root drench application, has been “a stab in the dark” in order to find a rate which is effective against the disease but not phytotoxic to the plant. “Pythium pressure was higher in June,” commented Kirsty. “We haven’t got any full plant death in the trial, but we do have symptoms.”

David George provided an overview of the first SCEPTRE trials on pests of protected edibles. After long discussions and some amendments it had been decided to focus on aphids on peppers, *Tuta absoluta* on tomatoes, two-spotted spider mite on tomatoes, with russet mite on potatoes and *Nazera* (which has become an issue on cucumbers in the Lea Valley for the first time this summer) on peppers being added for 2018. Like Kirsty, he explained how the products to be trialled had been selected, adding, “The rigorous selection process means that those products we are testing are effective.” David also highlighted some differences in the trial procedure used for SCEPTREplus compared with its predecessor. One of these is that variable spray rates and spray intervals will be used to reflect the best practice requirements of the different treatments being tested. In addition, there will be ‘increased consideration of



James Townsend of STC gave an overview of some of the non-SCEPTRE trials currently underway at the facility.

manufacturer recommendations' and 'increased levels of replication and joined-up approach to trial design.' Where a particular project partner may be better suited to run a particular trial, then this will also be taken into account.

Taking a step away from SCEPTRE, STC pathologist James Townsend provided details on two other AHDB-funded projects. CP137 is investigating the management of gummy stem blight (caused by *Mycosphaerella melonis*) and powdery mildew on cucumbers using new diagnostic tools, while PE024 is investigating downy mildew control on basil.

Mr Townsend explained that forecasting models for *M. melonis*, commonly known as 'Myco', have been developed, and the challenge is to now identify the best method of measuring spores in the greenhouse to allow the models to act as a useful risk assessment tool for growers. However, he stressed that the best control for Myco is rigorous hygiene, including the removal of all crop debris and thorough disinfection before introducing another crop. Using a weekly ELISA test for the inoculum can provide guidance on when stem treatment with a fungicide such as Talius® (proquinazid) or Reflect (isopyrazam) should be used. Trials had then compared the usefulness of spore trapping from the air by comparing spore counts with ELISA test results. So far results have been positive, but the logistics of counting spores and returning the results to growers need to be improved if the technique is to be commercially viable. Going forward, other work is also looking at potential diagnostics for powdery mildew caused by *Podosphaera xanthii* and *Golovinomyces orontii*.

The work on basil downy mildew (*Peronospora belbahrii*) has been a joint project between Fera, STC and NIAB and the two-year project is just coming to an end. As well as work on the epidemiology of the disease, it has also evaluated different fungicide programmes in large scale trials on both protected and outdoor crops. In addition, STC has been investigating the effect of different periods of night time illumination on suppressing the sporulation or infection of *P. belbahrii* on basil plants. "Applying a range of fungicide products in a programme helps disease control and also helps to prevent the development of disease," pointed out Mr Townsend. "The isolate of downy mildew that we used was insensitive to metalaxyl, while Revus, Paraat and Fenomenal provided the greatest control, although this was not 100 per cent and was only for a limited period." The lighting trials were somewhat inconclusive and did not show the expected decrease in disease level as the period of lighting was increased. However, there were some significant differences between the different treatments, suggesting more work in this area could be of use.

In the afternoon Chris Rundle who is Head of Efficacy for the Chemicals Regulation Division (CRD) at the Health



STC's Kirsty Wright demonstrating the cucumber *Pythium* root rot control trial to visitors.

and Safety Executive (HSE) provided an overview of current pesticide authorisation legislation and how the regulations are enforced. He pointed out that over the last 8 years the UK has lost 50 actives which have either failed to gain approval or have not been supported, but during the same period 59 new actives have been introduced. He also outlined other challenges, such as the proposed definition of endocrine disruptors and the way in which the European Commission assesses hazard and risk. He also pointed out that losing active ingredients and different modes of action makes it harder for the industry to tackle potential resistance.

Finally there was the opportunity to tour some of the SCEPTRE trials, as well as seeing new facilities which form part of the Crop Health and Protection (CHAP) Centre for Agricultural Innovation and STC's LED4Crops centre. This included the cucumber *Pythium* trial and the tomato greenhouse with the two-spotted mite trials. STC's Dr Martin McPherson explained planned upgrades to the indoor farming LED lighting facility, which is used to come up with different 'lighting recipes' before they are trialled on a commercial scale. He also demonstrated a prototype for STC's new 'deep hydroponic' testing facility which has just been approved.

GRO SOUTH LOOKS TO THE FUTURE

Building on its reputation, GroSouth 2017 once again attracted growers and exhibitors from across the country and mainland Europe. Hosted by Roundstone Nurseries near Chichester on November 8, visitors were able to go on nursery tours where they could see all aspects of Newey Roundstone's propagation and growing systems, plus attend a series of seminars throughout the day. In addition, there were approximately 100 exhibitors covering all aspects of professional horticulture.

Sinclair, the growing media suppliers, won the award for the "Best Stand" with Marketing Manager Joanne Edwards receiving the award from the show organisers. As in previous years there were four well-attended seminars with presentations by industry specialists. 'Labour Challenges in Horticulture' addressed a topical concern for growers. The presenter, Matt Jarrett of Proforce Recruitment, highlighted some of the main issues such as; the impact of Brexit, what the future could look like, and attracting and keeping your workforce. Matt began with an overview of the crisis horticulture is facing due to the shortage of suitable workers. He said; "labour providers are reporting supply is down 48% compared with 2016, and many growers were not able to get sufficient staff this summer. Many also reported that the quality of workers was not as good as previous years." Some workers from Eastern Europe said the fall in the value of the pound against the Euro made other countries



Bruce Harnett of Kernock Park Plants.

in mainland Europe more attractive, and there was a perception that it would be more difficult to get through the UK border now, said Matt. A Proforce survey showed the situation was likely to worsen with labour providers not being able to supply sufficient workers.

Proforce had suggested a number of ways of improving recruitment. These included: offering free transport for workers from their country of origin; not charging workers recruitment fees; offering improved pay and benefits; and offering good accommodation and better general working conditions.

Richard Hopkins, managing director of Fargro, the GroSouth 'Gold' sponsor, told The Commercial Greenhouse Grower that their technical department would be introducing a number of new bio-pesticides for protected crops for the 2018 season.

PlantCare, best known for their range of horticultural textiles, used the occasion to celebrate their 10th anniversary and to launch their new anti-slip and anti-fungal matting, SlipSure, a PVC grid matting for use in nurseries and packhouses.

Amongst the many new plant introductions at the show, John Hedges of Newey said their new varieties of Pittosporum, Silverball and Goldenball, were creating



Joanne Edwards receives best stand award on behalf of Sinclair from Alex Newey.



Carsten Thrane (Left) & Jeppe Baun (Right) of Ellepot.

great interest as gardeners looked for alternatives to Box due to Buxus blight.

Another well-known plant supplier, Kernock Park Plants, once again had a colourful range of plants on offer. M.D. Bruce Harnett, said their new introductions for 2018 included the Bidens variety 'Hot and Spicy' with large orange and yellow flowers.

Desch Plantpak, one of Europe's main manufacturers of trays and pots, featured a new Danish trolley and Euro trolley with watering trays that are ideal for supermarkets and the retail multiples.

A new innovation on the Mechanical Botanical stand was the Willburg Tagweld label applicator, which was being demonstrated by Mike Berry. The Tag Weld system is a secure method of attaching plant labels to pots. This system provides all the information on one label securely welded to the rim of the pot, and helps to eliminate the risk of labels being lost or tampered with.

Local plant raiser Blue Ribbon Plants of Chichester, last year's winner of 'Best Stand,' had a colourful display of bedding plants including cyclamen for next year.

Each year the show attracts a number of first time exhibitors. This year one such exhibitor was Arysta, the crop protection specialists, who received several enquiries



Chris Breed of Desch Plantpak.



Elaine Wheelan of Volmary.

from growers regarding their portfolio of fungicides, herbicides and insecticides.

Seiont Nurseries is a regular exhibitor at GroSouth and is a well-known supplier of ornamentals. Nurseries manager, Neil Alcock said that all their new introductions had been well received but especially their new Berberis thunbergii – Orange Sunrise, which changes colour as the season progresses.

An international exhibitor, Ellepot A/S of Denmark, gave demonstrations of their Ellepot paper pots that have established a market in the UK with nurseries and plant raisers. The paper is suited to greenhouse production and can be composted after use.

In conclusion, as always, this show was well organised and run by Sarah Jane Milbourn the event organiser and her management team. Both exhibitors and visitors said they were satisfied and had enjoyed a good day.

Next year GroSouth 2018 will take place on Thursday, November 1st.



Tony Marriot of PlantCare.

BIOPESTICIDE POTENTIAL UNLOCKED

Spence Gunn reports from the Cucumber and Pepper Growers' Day where the industry heard about trials to control pests and diseases using biopesticides alone

The dwindling number of chemical crop protection products approved for cucumbers and peppers means growers are finding it harder than ever not only to control pests and diseases but to manage the risks of them developing resistance to those that remain.

Although more biopesticides are being approved for use in the UK, however, many growers are finding them less reliable than 'conventional' products in practice, ADAS entomologist Mark Ramsden told the Cucumber and Pepper Growers' Day at Waltham Abbey in October.

But recent results from AHDB levy-funded trials, on control of aphids and of fusarium internal rot in peppers, and of botrytis and mildew in cucumbers, are showing how techniques need to be improved to make sure biopesticides can be as effective as other products.

"Using biopesticides in an integrated pest or disease management programme needs a basic shift in approach," said Dr Ramsden. He is taking part in AHDB's major research programme 'Amber' to provide growers with better guidance on how to use biopesticides by focusing on more timely and accurate applications.

"The project started in 2016 and the first trials were designed to see what might affect performance when growers used a range of biopesticides according to the [product] instructions," he said. From those results, the project is now looking in more detail at where growers need more information, in areas such as product mixing, spray methods and judging when pest populations or disease infections are at a level that will enable any beneficial organisms to establish.

In one of last year's trials, the bioinsecticide Botanigard WP – based on the insect-killing fungus *Beauveria bassiana* – was used against an established peach-potato aphid population in an organic pepper crop. "Botanigard is recommended for whitefly but growers also use it against aphids and our laboratory tests showed it is capable of killing aphids within six days after application," said Dr Ramsden.

The grower applied Botanigard on its own or as a tank mix with the physically acting, organic-approved Majestik,



Mark Ramsden: techniques need to be improved.

which was also tested on its own for comparison. All treatments were applied twice, six days apart, using a trolley-mounted vertical boom sprayer with four pairs of 80-degree hollow cone size 03 nozzles angled at 45 degrees upwards.

"The aphid population was patchy but large and none of the treatments reduced numbers compared with those on untreated plants," he said.

Dr Ramsden said temperatures in the crop during the trial had been well within the recommended limits for Botanigard, of 15 to 30°C, while humidity was also well above the recommended minimum at the first application, though slightly lower at the second. "Checks showed that the sprayer was delivering live spores on both upper and lower leaf surfaces but that their distribution was variable," he said. "One issue may have been the closeness of the nozzles to the plants, so the outer leaves may have shielded those within the crop canopy."

The trial highlighted the difficulty of achieving the correct application volume. This is critical with biopesticides

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Dave Kaye: significant control of fusarium internal rot in peppers.

based on fungi or bacteria because if the recommended dose is applied in too much water, some droplets won't contain any viable spores. "In this case, there was no information available on how to adjust the optimum volume for the height of 'vertical' crops," said Dr Ramsden.

He suggested that the effect of UV radiation in sunlight on the biopesticide spores and the fact that the aphids

were already well established were also factors in the lack of control. "Biopesticides have the best chance of being effective if applied in the early stages of a pest or disease outbreak," he said.

Mildew on cucumbers was the subject of another 'Amber' trial in a commercial crop last year where the biofungicide AQ10 (based on *Ampelomyces quisqualis*, a fungus which parasitises powdery mildews) was compared with the grower's current practice of spraying Reflect (isopyrazam) as soon as the disease is seen.

In the trial, two varieties in a three-week-old crop – the intermediately mildew-resistant Bonbon and the susceptible Bonifacio – was sprayed with AQ10 using a vertical boom with five pairs of 80-degree flat-fan size 02 nozzles angled 45 degree upwards.

As with the pepper trial, it proved difficult to set the correct volume and in this case it's likely that the grower applied a higher volume than intended. There were some problems, too, with mixing the spray solution for the first application, which may explain why no viable *A. quisqualis* spores were recovered afterwards from either the spray solution or treated leaves. Even so, by the end of the trial, there was less mildew infection in treated than in untreated rows. There was also evidence that AQ10 worked more effectively with the resistant variety as here only traces of mildew were seen compared to an average 4.5% infection level on untreated plants of the same variety.

"We've learned that there's still a lot of missing information for growers in areas such as how to ensure you get the application on at the first sign of a pest or disease, the frequency of application and the required dose – how many spores of the active organism you need to hit the target pest or infected leaf," said Dr Ramsden. He said the project was currently using the

sprayer research laboratory at Silsoe to help refine spray techniques, and computer modelling to reveal more about how the effectiveness of bioinsecticides are affected by the proportions of different pest life-stages in a population.

In separate AHDB-funded work, two biofungicides currently approved on peppers have given significant levels of control of fusarium internal fruit rots, project leader and ADAS crop pathologist Dave Kaye told growers.

Trials in 2015 compared the effectiveness of a single preventive spray of Serenade ASO (based on the bacterium *Bacillus subtilis*) with a three-spray programme of the product where the crop was being deliberately infected. In both cases the treatment was applied to the crop itself, the floor and the slabs. Early results from that trial, presented to the Cucumber and Pepper Growers Day the same year, seemed to suggest that a single spray might be persistent enough, but analysis of the final data showed that only the three-spray programme significantly reduced the numbers of fruit showing symptoms compared with fruit from untreated plants.

"At the first three harvest dates we found virtually no symptoms after incubating small green or mature fruit, even in untreated parts of the crop," said Mr Kaye. "At the fourth harvest 3.9% of the untreated fruit had internal



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symptoms and there was no reduction from the single Serenade spray. The three-spray programme cut this to 2.9%." At the fifth harvest, 11% of the mature fruit had internal symptoms; the three-spray programme reduced this to just 0.6%.

Trials last year looked at three biopesticides in a growing crop where a natural infection was allowed to develop. Serenade ASO and T34 Biocontrol (the beneficial fungus *Trichoderma asperellum*) were each applied either as a three-spray preventive programme to the open flowers – as this is the entry point for the disease – or as a resistance elicitor at plant propagation. An experimental product based on plant extracts was also tested as an elicitor. "Both Serenade and T34 as preventative sprays gave significant reductions in disease in fruits that developed from flowers that were open at the time of treatment," said Mr Kaye. "The fact that disease levels were low in untreated areas of the crop shows the importance of applying these products before infection levels rise."

T34 and the experimental product also gave a small but significant reduction in infection of fruits picked immature, when used as elicitors at propagation. "Throughout the trials we have found that fusarium levels tend to be greater in flowers and immature fruit than in mature fruit," said Mr Kaye. "This implies that some infected flowers or fruit will abort, or that infection is restricted in some way as the fruit matures. If we could find out more about that, it could point to another means of managing the disease."

Levels of this internal rot have generally been low in UK crops in the past two years but were higher this year in the Netherlands so it's not a problem that has gone away and work by AHDB over the past few years has not only pinpointed two useful biopesticide options but uncovered a lot more about the pathogen itself and how it behaves.

Sampling from pepper nurseries in the Lea Valley for the first time confirmed *Fusarium lactis* as the pathogen responsible for most of the rots. Experiments in which the course of infection in individually tagged flowers and fruits was tracked showed that the fungus gains entry through open flowers and grows inside the developing fruits – when flowers were deliberately inoculated almost 80% of the resulting fruitlets became infected.

"Although the fungus has been shown able to spread from deliberately infected seed to the propagation cube, a survey in 2015 found no evidence that commercial seed lots were contaminated," added Mr Kaye.

The notion that organic crops were less susceptible, because their flowers could support a more diverse microbial community, was checked by monitoring both organic and conventional crops over two years. There was no difference between them in terms of disease levels – though it hadn't been possible to compare the same varieties under both systems, said Mr Kaye.

LEARNING TO LIVE WITH MORE HUMIDITY

Avoiding high humidity can cut the risk of various diseases developing in protected crops but there's always a trade-off with the cost of the energy being lost, through open vents, or used, by pipe heat, to achieve that, writes Spence Gunn.

Dutch growers adopting the so-called 'next generation growing' approach to managing the glasshouse environment, though, are accepting higher humidities and temperatures, which is one of the principles of the system. They are looking to halve their energy use compared with that of 2010, set as the baseline.

Jon Swain, senior engineer at energy consultancy FEC Energy, told the Cucumber and Pepper Growers' Day at Waltham Abbey in October, that two grower study groups have been set up under AHDB's GrowSave knowledge transfer scheme to explore the practicalities of implementing 'next generation growing' under UK conditions.

"There has been a lot of interest in 'next generation growing'," he said. "You can make big savings by adopting the elements that you feel comfortable with – you don't have to do it all.

"For example, keeping the screens closed for longer is what really underpins the technique but that may be something you feel less comfortable with initially. You can start with some of the simpler elements such as installing fans and apex seals to help maintain a more even distribution of humidity and temperature."

Fans are cheaper than pipe heat as a way of ensuring a uniform temperature distribution, he said. One horizontal fan per 500sq m should recirculate the air twice an hour – and if running daily for 10 hours, it will cost about £45 per ha per week compared with £120 to supply an extra 10°C of pipe heat from a biomass boiler.

Modern thermal screen materials are designed to 'wick' moisture through them more effectively than older ones. This means that vents can be opened above a closed screen to control humidity while minimising heat loss, he pointed out. "You can vent first, then gap the screen, and then consider pipe heat," he said.

Closing screens earlier before nightfall can also help avoid radiant heat loss – on a clear evening, in particular, the plant's temperature will fall faster than that of the



Jon Swain: study groups will explore the practicalities of implementing 'next generation growing'

air. "It's now possible to use infra-red cameras to monitor plant temperature and use that, rather than air temperature, to close the screen," said Mr Swain. "It's also worth measuring conditions above the screen so, for example, you can delay opening in the morning so that the air above has more chance to warm up."

A new range of wireless environmental and crop sensors that can be linked to environmental control was being promoted by Dutch manufacturer

30MHz, exhibiting at the event. The company was set up three years ago to supply sensors for industrial applications and began working with Dutch growers a year later. It began operating in the UK earlier this year.

One of its latest products is a remote sensor for monitoring the surface temperature of fruits or leaves, developed in conjunction with a Dutch pepper grower to help manage the risk of scald on the fruit. It's linked to the environmental control system and opens the vents when the skin temperature reaches 40°C. "In trials it resulted in a 5% increase in marketable yield," said 30MHz director Anthony Yousefian.

Another sensor measures dewpoint on fruits and leaves to monitor disease risk. Altogether 14 sensor types are available and Mr Yousefian told Commercial Greenhouse Grower that others could be developed to monitor most aspects of the crop or its environment.

"As it is a wireless network it is easy to set up and you can start with a single sensor and the wireless hub, and build up from there," he said. The system can link to a desktop computer or mobile device.



The 30MHz sensor for monitoring the surface temperature of fruits or leaves.



How to reduce your corporation tax, with government encouragement and easy-to-access professional support. The reasons why you should share the profits of your business with your employees. Why growers should lobby for continued government funding of producer organisations, regulated as they would like them to be after Brexit. Reports John Sutton.

These were a handful of the highlights from the second GrowQuip conference, organised by the Commercial Horticultural Association. Its objective was to bring together growers, their suppliers of goods and services, and the researchers whose work will largely shape the future of the industry. At this year's conference, with Brexit looming, there was a supportive political input, too. Conservative MEP Anthea McIntyre, lead speaker on the GrowQuip conference schedule, serves on the Agriculture Committee of the European Parliament. In 2014 it adopted her report on 'The future of Europe's horticulture sector – strategies for growth'. A successful businesswoman, she is active in politics in the West Midlands, where she was a County Councillor for six years. Since her election to the European Parliament in 2011 she has established a reputation as an advocate for the horticultural industry. The scope of her lecture embraced an update of EU



Anthea McIntyre MEP and Neil Bragg.



Jack Ward of the British Growers' Association makes a point.

activity, particularly in plant protection. She expected that the future government legislation that will replace the Common Agricultural Policy after Brexit will largely follow existing EU policy in technical matters, wherever 'science agrees'.

Jack Ward, chief executive of the British Growers Association, told his audience that growers and farmers 'now have a unique opportunity' to engage in pressurizing the government to implement UK policies that are producer-friendly. He highlighted the need for support for technology that reduces labour input. He believes that producer organizations, operating under rules more favourable than at present for UK growers, could have a much bigger future. In 2016 there was EU funding of €870m for these organisations. Each of the three countries France, Italy and Spain received over €200m, while only €40m went to the UK because of lack of uptake by producers.

Jack Ward called for greater governmental support for increased productivity and improved quality through producer organizations and otherwise. Anthea McIntyre had drawn attention to the start very recently made here, with the £40m worth of grants made available under the Countryside Productivity Scheme. The range of eligible projects is very wide, and can include LED lighting. There is also government funding available by means of tax relief for a very wide range of business investment in research and development. The effect is equivalent to a grant of 33% of approved costs. Shenal Wijetunge of the specialist tax consultancy GovGrant pointed out that HMRC takes a very broad view of activity that is eligible. In most of the SME's that make successful applications, there is no R & D department, and 'no staff in white coats'. Eligible activity, to help resolve business uncertainty or

drive efficiency, could include trials, surveys or University consultancy. Shenal is a senior business development manager for GovGrant, a service provider that guides businesses through the work of application. The average claim of SME's is just over £50,000 per year, he said. And claims can be made for up to two previous financial years. Other speakers at the conference included George Beach, m.d. of Mudwalls Farm, fruit and vegetable growers and branded produce suppliers. Sharing 25% of his company's profits with his thirty-strong staff had laid the ground for the success of Majestic Trees, said founder Steve McCurdy. And there were two speakers on fruit, Markus Kobelt from Lubera in Switzerland and breeder Felicidad Fernandez of NIAB EMR.

This second GrowQuip conference attracted a larger audience than the first, with growers from the Lea Valley, south-east England and the Vale of Evesham. Other sectors well represented included horticultural supplies and marketing.

REVOLUTION OR BUBBLE?

With LED lighting for horticulture, we are at the very start of a revolution, said Professor Simon Pearson of Lincoln University. However, some caution is needed before committing to major expenditure in this technology at present. There is still difficulty in establishing confidence in the return on investment and running costs, he said. However, these are falling, and efficiencies are improving. He singled out strawberries as a crop where the existing evidence looked particularly supportive.

Patrick Bastow, previously m.d. of Lincolnshire Herbs, brought his expertise in vertical growing and energy saving to his contribution to the conference. He predicted a positive future for LED lighting in more widespread application to plant propagation.

Both speakers thought that the future of vertical urban farming looked promising internationally. In the UK at the present time, though, there still needed to be special factors in place to justify confident investment.



Speaker Markus Kobelt of Lubera.

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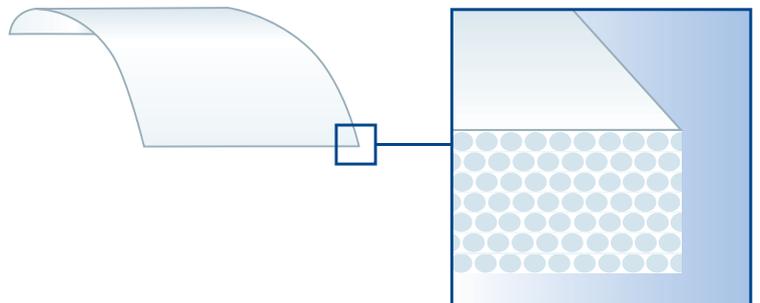
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