

The GROWER

THE TECHNICAL JOURNAL FOR HORTICULTURE

AHDB



Issue No. 236
Oct/Nov 17

REGAINING ABSOLUTA CONTROL

Regaining control of the pest *T. absoluta*
may be closer than you think

COME FLY WITH ME

How can you best attract beneficial
hoverflies into your crops?



COMMENT

“Ten people who speak make more noise than ten thousand who are silent”

Napoleon Bonaparte



Gary Taylor, Chairman,
AHDB Horticulture
gary.taylor@ahdb.org.uk

40 years ago I picked my first tomato. 15 years ago I started growing peppers. But it wasn't until around 14 years ago that I began growing my ideas.

That was when I first decided to give a few hours every few months to have my voice – and the voices of those like me – heard as a HDC panel member. I went on to chair that panel and eventually became chair of the AHDB Horticulture board.

I believe that I've contributed more to the industry through my involvement with AHDB's panels, than I ever could have done on my own. Contributing ideas, listening to those around me in the industry, and helping to push for progress, has been a hugely rewarding experience and one I'd wholeheartedly recommend to every grower.

Brexit poses unprecedented challenges. Labour is likely to be less readily available and more costly. Pesticides may become more difficult to obtain for minor uses. Evolving trade arrangements may strengthen our position in some markets and weaken it in others. The need to increase productivity and resilience has never been greater.

These are challenges the industry must face together. Together we can inspire each other, share our knowledge and expertise and make a real difference for the whole of horticulture, not just our own businesses.

Sector panel elections are happening right now, so this is your chance to have a voice and be heard. Whatever you grow, you can help shape how the industry looks in the next five, 10 or 50 years – and beyond.

You can find out more about how you can make a difference on page 8.

Young people are the future. Our studentships programme has funded over 70 students since its inception, not only to give them the skills and experience required to continue in the industry, but also funding work on some very important studies over the years that will have major benefits to current growers too. This issue is a fantastic illustration of the contribution they make; PhD student Bethan Shaw is aiming to use the natural circadian rhythm of organisms to find ways to tackle SWD on page 10, PhD student George Scott is researching the benefits of Hormetic UV-C light on page 29, and we speak to former studentship researcher Rachel Warmington about how the programme has helped her enter into the industry over on page 31.

The ability to shape the future is within our power – how do you want it to look?

CONTENTS

- 3 News & updates**
- 5 EAMU latest**
- 6 Stronger together**
SCEPTREplus update
- 7 Come fly with me**
How to encourage friendly hoverflies into your crop
- 8 Your voice, your future**
Panel elections: have your say
- 10 Getting into the rhythm**
Using circadian rhythm to tackle SWD
- 11 The Drosophila effect**
Could collaboration with Japan help combat SWD?
- 12 Pestbusters**
What are biopesticides?
- 14 Viva Vivando**
A new weapon for mushroom growers
- 16 Seeking Absoluta control**
Research into defeating Tuta absoluta once and for all
- 18 A new look for an old favourite**
The UK Onion & Carrot Conference returns with a fresh look
- 19 Tech it to the max**
Insight from the AHDB Herbaceous Perennial Technical Discussion
- 20 Staying grounded**
Is your soil fitness regime up to scratch?
- 22 Insight into AHDB projects**
- 23 Don't ignore your cold store**
Are you losing money through bad cold store management?
- 24 Setting a new standard**
Everything you need to know about the latest Red Tractor standards update
- 25 On the right wavelength**
Using hyperspectral imaging to detect stress in fruit crops
- 26 A cut above**
Talking points from the National Cut Flower Centre open day
- 28 What's in store for your onions?**
How to improve onion storage
- 29 Lights, cinerea, action**
Might UV-C hormesis help to quell plant pathogens?
- 30 Emerging talent**
How AHDB is funding the next generation of horticultural experts
- 31 Safeguarding the future**
We speak to former AHDB studentship researcher Rebecca Warmington about her experience

NEWS & UPDATES

IN BRIEF

A survey has been conducted by AHDB to establish the current level of use of automation and robotics in horticulture and to identify where future investment in technologies could be made, to help address concerns about labour availability and costs.

Selected businesses are now being contacted for in-depth studies.

SOIL HEALTH, SOIL BIOLOGY

AHDB and the British Beet Research Organisation (BBRO) have announced an ambitious new research partnership to develop practical soil biology management guidance.

Soil Health and Soil Biology is a five-year partnership to improve on-farm understanding of soil health by benchmarking current academic and industry knowledge and building a far-reaching knowledge exchange programme in response.

MONITORING ON THE MOVE

Monitoring crops of Brassicas, sweetcorn, curcubits and outdoor leafy salads in the field will now be easier with the publication of four new AHDB Crop Walkers' Guides. The concise guides are designed to help growers accurately identify pest, disease, nutrient deficiencies and disorders in crops.

BETTER BIOSECURITY

Growers of crops in protected environments can now easily access recommendations for measures that can be put in place to minimise the risk of pest, disease, virus and viroid spread. The AHDB biosecurity online guide collates the latest best practice guidance to help manage both existing and new threats.

NEW DIAGNOSTIC TOOL TO IDENTIFY CROP PATHOGENS



A new industry partnership project will pilot diagnostic tools for Brassica and onion crops to address the economic losses resulting from disease epidemics.

Lateral flow devices, initially developed for the medical healthcare industry and now being adopted across multiple disciplines will be trialled by growers with their experiences shared with wider the industry. It is hoped that the project demonstrates the value of the tests in helping with decisions around fungicide applications for onion downy mildew and; light leaf spot, ringspot and Albugo in Brassicas.

Early, pre-symptomatic, detection of the presence of infective spores in the location of the crop can be used alongside weather data to indicate the risk to the crop of disease development and spread. This information can be used by growers to determine the timing of fungicide applications.

“Disease detection systems can play a vital role in the sustainability of crop production by reducing the amount of cropping necessary to ensure the continuity of supply. Leaf diseases can impact on crops through cosmetic damage to vegetable Brassica and salad onion foliage and result in yield loss in bulb onions” said, Cathryn Lambourne, AHDB Crop Protection Senior Scientist.

Diseases of vegetable Brassica and onion crops can be difficult to control in the UK. The reduced numbers of active ingredients and pressure to reduce maximum residue levels in crops is dictating the number and types of application of fungicides to crops. Therefore information which may help reduce the number of applications can play an important role.

Euan Alexander, Kettle Produce, Field Operations Manager, said, “The long period between disease infection and symptom appearance which is a characteristic of many of these diseases can lead to diseases becoming established in crops before symptoms appear. Utilising these tests will enable us to select the appropriate fungicide and application timing as part of our ICM strategy before the disease renders any of the crops unmarketable”.

Additionally many of these diseases are difficult to diagnose correctly and at low levels in crops are difficult to detect and observe. The use of information from detection systems for these diseases has been shown to be very effective in controlling these diseases with the existing approved fungicides in previous trials.

Warwickshire College will lead the work and manage grower trials while Mologic Ltd will produce the tests and take the diagnostic tool to market once successful.

FUTURE FOCUS FOR R&D IN HORTICULTURE

Research, development and knowledge exchange experts gathered to discuss priorities and develop lasting partnerships, to drive innovation and improvement in UK horticulture.

More than 60 representatives from leading universities and research centres attended the event, organised by AHDB, near Nottingham, in the summer.

Six specific areas will provide increased focus for future work: realising genetic potential, building sustainable plant and animal health, managing resources efficiently and sustainably, driving precision technology into practice, facilitating trusted food in the supply chain, and honing business and technical skills.

AHDB Chief Executive Jane King said, "With seismic changes going on globally, we are entering a defining time for UK agriculture and horticulture. It's a time when we face challenges, but there are also many opportunities."

"Working with our partners to develop shared research and knowledge exchange goals, we can pull together and drive changes, which will build a world-class agricultural industry."

SHOWCASING LATEST RESEARCH FOR SOFT FRUIT

Controlling spotted wing drosophila (SWD), targeting thrips and managing powdery mildew will be just some of the research topics being discussed at AHDB Horticulture/EMR Association's annual Soft Fruit Conference.

The conference has been confirmed for 21 November 2017 at NIAB EMR, East Malling, Kent to deliver a technical update for the soft fruit industry.

Growers will be provided with an insight by researchers, industry experts and PhD students into work being undertaken to tackle the key challenges faced by the soft fruit industry and will include recommendations on how to implement findings.

Scott Raffle, Knowledge Exchange Manager at AHDB said, "The agenda for the conference is packed, covering research on blackcurrant sawfly to the latest results from the strawberry and raspberry breeding programmes."

"We hope as many growers as possible attend the event to hear how the latest research can help to have a direct impact and benefit for their business."

To book, visit horticulture.ahdb.org.uk/events



A FRUITFUL OPPORTUNITY

Grab this exciting chance to showcase your business at Fruit Logistica 2018

Fruit Logistica in Berlin is a well-known, well-respected and highly attended event where fresh produce companies go to do business. The 2017 event had 3,077 exhibitors from 84 countries and over 75,000 trade visitors from 130 countries. This event brings together importers and exporters, fruit and vegetable producers, wholesalers and retailers, and packaging and handling specialists, alongside transport and logistic specialists.

AHDB will once again host a British hub at Fruit Logistica – which takes place next year from 7–9 February in Berlin – to showcase Great Britain's horticulture and potato industries.

This is a fantastic opportunity to develop relationships with partners across Europe, to explore the possibility to export to new markets, and showcase your business and products to international trade visitors.

The AHDB stand provides farmers and growers with a focused hub to do business and champion the UK's reputation for outstanding food and farming. Co-exhibitors will have dedicated branded exhibition booths, meeting space, and networking opportunities in a fully managed and catered stand.

Places are limited and with co-exhibitors already lining up, we recommend you book your space now.

Tony Padoan, Jepco, who co-exhibited in 2017 said, "Exploring the opportunity of exports really excites us and the feedback we have highlights the real potential for our business. From my point of view, exhibiting here has been a fantastic investment; there is a real hunger here for our products. I have just had a meeting with someone looking to develop our product to export to Holland, Belgium and France. If even a fraction of the potential business opportunities we have discussed here come off we will still be doing amazingly well."

To register your interest please email hort.info@ahdb.org.uk or amanda.robins@ahdb.org.uk

EAMU UPDATES



Capsid damage to petioles.

PLUGGING THE GAPS

“Unfortunately growers sometimes find themselves in a situation where there are very few or no plant protection products available to them for control of a particular pest, disease or weed. In such situations there is a provision which allows our regulator Chemicals Regulation Division (CRD) to issue an Emergency Authorisation (Article 53) replacing on the market a product for 120



Bolette Palle Neve,
Crop Protection Scientist, AHDB

days. We get many requests for such authorisations and we work closely with CRD to help growers where we can. However, we're not always successful and this can cause frustration for all parties. For emergency applications there are certain processes we need to follow. Some are based on European Regulation 1107/09 and some are national processes implemented by CRD. Each application has to be supported by a very strong case for need outlining why the authorisation is required, and it cannot be issued in advance of an emergency situation. However, ideally CRD want applications for emergency authorisations at the start of each year. This makes sense as it gives plenty of time for authorisations to come through but it does require some crystal ball gazing and is near impossible for unexpected emergencies eg sudden pest migration.

This year we submitted an Emergency Application for an insecticide in carrots as aphid numbers were increasing in mid-June. Our Pest Bulletin was reporting high numbers of aphids in traps and there was clearly a need for another insecticide to manage the pest. However, as these applications require assessment by CRD, followed by consideration by the ECP and final signoff by Defra, the pest pressures can change in the interim. Therefore, when a decision was made six weeks later, aphid numbers had decreased and the authorisation was refused as a result. Hopefully carrot growers have managed without significant crop losses but it is frustrating when time and money has been expended for no result. We will, however, continue to work with CRD to give growers access to the products they require.”

EAMUS IN FOCUS

Exirel 10SE (cyantraniliprole) & Benevia 10OD (cyantraniliprole)

AHDB have again this year secured a number of Emergency Authorisations for the products Exirel 10SE and Benevia 10OD (both containing cyantraniliprole) for control of SWD in soft and stone fruit crops. These authorisations cover use in outdoor blueberry, raspberry, blackberry, plum and damson, and outdoor and protected cherry and strawberry crops, giving growers a vital addition to their very limited crop protection armoury for this damaging pest. Some of the data supporting these authorisations has been generated in collaboration with colleagues in the EU Commodity Expert Group and Du Pont, showing that our work with European groups can provide real value for growers. We've also secured authorisation for use of Exirel 10SE in outdoor and protected blueberry, raspberry, blackberry, cherry and strawberry, and outdoor plum and damson crops.

Decis (M16124) (25 g/l deltamethrin)

A new EAMU has been issued for Decis (deltamethrin), for the control of capsid and caterpillar on celery. The original approval was lost in August 2014 following the re-registration of deltamethrin.

Residue trials requested by BLSA and funded by AHDB have generated data that has allowed the MRL to be amended and a revised EAMU has now been issued.

David Norman, technical consultant, British Leafy Salads Association, explained, “The main target is celery capsids which cause considerable damage by feeding on celery petioles and in celery hearts. The feeding damage causes brown discolouration and badly affected sticks are unmarketable. The use of Decis will allow improved control of capsid bugs and is warmly welcomed by the leafy salads industry.”

To discover all of the latest EAMUs visit horticulture.ahdb.org.uk/eamu-news

STRONGER TOGETHER

Collaboration is key to securing access to plant protection products

The close collaboration of crop protection companies with the SCEPTREplus programme is helping deliver promising results, which will have a real impact for the future availability of plant protection products for growers.

So far, 18 crop protection companies have contributed to SCEPTREplus with either financial or in-kind contributions of products to use within the trials.

Over 65 products have been submitted, with 23 novel products that will now be screened. Products include a mix of biopesticides and synthetic conventional chemistry. It is hoped that more products will continue to be submitted for trials throughout the four-year programme.

Due to pressures driven by market factors, crop protection companies often don't develop products specifically for use on minor horticultural crops, due to the high costs and resources involved in developing data for applications of use.

The Crop Protection Team at AHDB work closely with crop protection companies to identify either novel products, or products with existing label approval to test for new uses on different targets, different crops or with different application timings.

Joe Martin, Crop Protection Senior Scientist at AHDB, said, "The relationship with crop protection companies is vital for SCEPTREplus as we're only interested in testing products that have a realistic chance to be able to be brought to market for growers to use. Working closely with these partners makes sure we're identifying products that growers might not otherwise get access to."

Many of the companies involved in SCEPTREplus also contributed to the SCEPTRE project, where almost 160 synthetic products and biopesticide products were reviewed. The impact of this is still being felt, with 10 on-label approvals and 12 EAMUs already delivered and yet more anticipated.

SCEPTREplus is a four-year programme designed to respond to emerging crop protection issues as well as looking at longer term future issues helping provide solutions for growers.

Find out more at horticulture.ahdb.org.uk/sceptreplus

SCEPTREPLUS

Eye on industry...



Simon Leak, Marketing and Development Country Manager UK & Ireland, Belchim Crop Protection Ltd.

WHY DID BELCHIM CHOOSE TO CONTRIBUTE TO SCEPTREPLUS?

Growers of minor crops are fighting similar problems that arable farmers face but with a severely restricted armoury of weapons. After successes in the original SCEPTRE project we wanted to carry on to see where we could help again, as the availability of useful and new solutions - be that conventional chemistry or biologicals - does not get any easier. For a manufacturer it is very difficult to justify investment into minor crops, so without the SCEPTRE projects and the help of AHDB funding a number of the current solutions being used by growers would never have been identified as options or made it to market.

WHAT ARE YOU HOPING SCEPTREPLUS IS GOING TO ACHIEVE?

Registration of some of our existing or new actives onto minor crops, obviously, but actually sometimes approval of a complementary active ingredient, even if it is not one of our own, can also help to create a more complete solution, which in turn helps our own product offering.

CAN YOU GIVE ANY INFORMATION ABOUT THE TYPES OF PRODUCTS SUBMITTED?

We tried to submit products where the biggest gaps lay in terms of options and where we knew they could significantly contribute to a grower's armoury against particular problems; products we thought would have a good chance of surviving the EU renewal process so we as a business were committed to them and where we were fairly confident of crop safety and efficacy.

“The impact of SCEPTRE is still being felt, with 10 on-label approvals and 12 EAMUs already delivered”



COME FLY WITH ME

Often viewed as welcome guests to the fields of growers across the UK, Chantelle Jay (NIAB EMR) investigates how to encourage beneficial hoverflies into your orchards

“One strategy that may ‘bear fruit’ is to increase the populations of predatory hoverfly earlier in the growing season”

Tree fruit growers will be all too aware of the damage that aphids can wreak on their crops, with perhaps the most detrimental of these being the rosy apple aphid. Following the withdrawal in recent years of control products, such as chlorpyrifos and pirimicarb, there's a dire need for solutions that can target aphids in orchards.

There are many naturally occurring predators that attack aphids and other pests, but they often migrate into orchards as the pest population increases, which can be too late in the season to prevent damaging populations of the pest from occurring.

One strategy that may ‘bear fruit’ is to increase the populations of predatory hoverfly earlier in the growing season, in the spring, so that they can prevent aphid populations from building up.

But how can these friendly flies be encouraged into orchards?

Some beneficial insects are attracted to the herbivore induced plant volatiles (HIPVs) that plants produce naturally as a response to insect attack. HIPVs have been used to lure such insects into grapes, soybean and hops in large scale experiments in the US. Volatile components of aphid pheromones may also be attractive to hoverflies. The aphid alarm pheromone (E)- β -farnesene (trans- β -farnesene) has been shown to repel aphids, while attracting beneficials such as parasitoids and predators.

In AHDB-funded project TF 218, led by NIAB EMR, hoverflies were attracted to traps baited with volatile dispensers, which were produced by the Natural Resources Institute, University of Greenwich. Replicated experiments were carried out over three years to determine whether volatile compounds, either applied individually or as blends of volatiles, were attractive to hoverfly adults in apple orchards.

Work in 2014 and 2015 indicated that a combined dispenser including two or more volatiles, such as phenyl ethanol and methyl salicylate, or phenyl ethanol, methyl salicylate and (E)- β -farnesene, would be more promising than a single dispenser.

A large multi-site experiment in 2016 compared different combinations of the volatiles, and the volatiles individually. In these tests, 29 different species of hoverflies were found in the orchards, with 1,700 individuals identified.

To decide which volatile blend to use on a commercial scale, the cost and benefit of a dispenser and deployment need to be considered. Ideally, volatile dispensers should have a comparable cost to the product they are intended to replace and not exceed any economic return. Research in the US has used dispensers hanging in the crop at a deployment rate between 185 or 123 dispensers per hectare.

The volatiles phenyl ethanol and methyl salicylate are relatively inexpensive to purchase and, including manufacturing cost, a combined phenyl ethanol and methyl salicylate dispenser could be feasible. The chemical company Amyris Inc., USA, is now using a novel yeast production method to produce (E)- β -farnesene. This could make a triple lure with methyl salicylate, phenyl ethanol and (E)- β -farnesene of interest.

Rob Saunders, Horticultural Agronomist at H L Hutchinson Limited and AHDB Tree Fruit Panel Chairman, said, “Given the serious rise of aphid populations since the loss of chlorpyrifos and pirimicarb, the need for control of these pests in our orchards has never been greater. I am following this latest research into use of lures to attract hoverflies with great interest.”

The results from the work will be taken forward in another AHDB project, TF 223, where the dispensers will be used in large plots in newly planted orchards.

AHDB project code: TF 218

Project leader:
Chantelle Jay, NIAB EMR

Key staff: David Hall, NRI

AHDB lead: Scott Raffle

YOUR VOICE, YOUR FUTURE

Help steer the industry as an AHDB Horticulture panel member

AHDB Horticulture is calling on forward-thinking and passionate levy payers to apply to join their crop sector panels. The election process is now open and there are currently 15 vacancies across five sector panels.

Rob Saunders, an agronomist at H L Hutchinsons, took chairmanship of the Tree Fruit Panel in the last 12 months, following a stint as a panel member on the Soft Fruit Panel.

“AHDB has an important role to play in tackling some of the critical issues affecting our industry. I’ve witnessed in my involvement with panels the vital industry voice we represent which helps to steer and guide researchers and scientists to ensure their work is of value to growers,” said Rob.

Gary Taylor, AHDB Horticulture chairman said, “We want new thinking and new ideas to come in and make positive change. The panels are the best way for AHDB to engage with the industry on what their priorities should be.”

WHAT'S INVOLVED?

Panel members serve a three-year term that starts in January and agree to attend two panel meetings per year with the occasional teleconference meeting to pick up any pressing matters.

While on the panel you will assess new project proposals for their scientific quality, value for money and potentially how successful this can be for the future industry. On an ongoing basis you will monitor the progress of funded projects ensuring that they meet their objectives. Panel members also play an important role in determining the strategy for future work being commissioned in their sector.

If you find a particular project of high interest you can volunteer as an industry representative for the individual project which will mean you will receive latest results first-hand.

ARE YOU ELIGIBLE?

To join the panel the candidate must be employed by a current horticultural levy payer (meaning the business must have been required to pay levy based on their returns for 2016/17). Existing panel members can apply for a second three-year term but no member may serve more than two consecutive three-year terms.

TO APPLY

The deadline for applications is 31 October 2017. You can apply via an electronic submission on the AHDB Horticulture website – horticulture.ahdb.org.uk/panel – or complete and post the enclosed application.

For more information on the vacant positions please email hort.panels@ahdb.org.uk or contact the relevant panel chairman, of which details can be found on the AHDB Horticulture website.

INTERESTED IN JOINING ONE OF OUR PANELS?

HERE ARE THE CURRENT VACANCIES:



Field Vegetables Panel

Panel Chair: Martin Evans, FreshGro

There are vacancies in the following areas of expertise:

- Leek production

Protected Edibles and Mushrooms Panel

Panel Chair: Robert James, Thanet Earth

There are vacancies in the following areas of expertise:

- Organics
- Peppers (plus any of cucumbers, aubergines and tomatoes)





Soft Fruit Panel

Panel Chair: Dr Louise Sutherland

There are currently no vacancies but we would be interested to hear from growers thinking of joining in the future

Hardy Nursery Stock Panel

Panel Chair: Martin Emmett, Binstead Nursery

There are vacancies in the following areas of expertise:

- Heathers
- Shrubs and climbers x2
- Trees and hedging
- Propagation
- Herbaceous perennials, alpines and grasses



“ AHDB has an important role to play in tackling some of the critical issues affecting our industry ”



Protected Ornamentals and Bulbs & Outdoor Flowers Panel

Panel Chair: Michael Mann

There are vacancies in the following areas of expertise:

- Bedding plants (pack and pot grown) x2
- Pot plants (eg orchids)

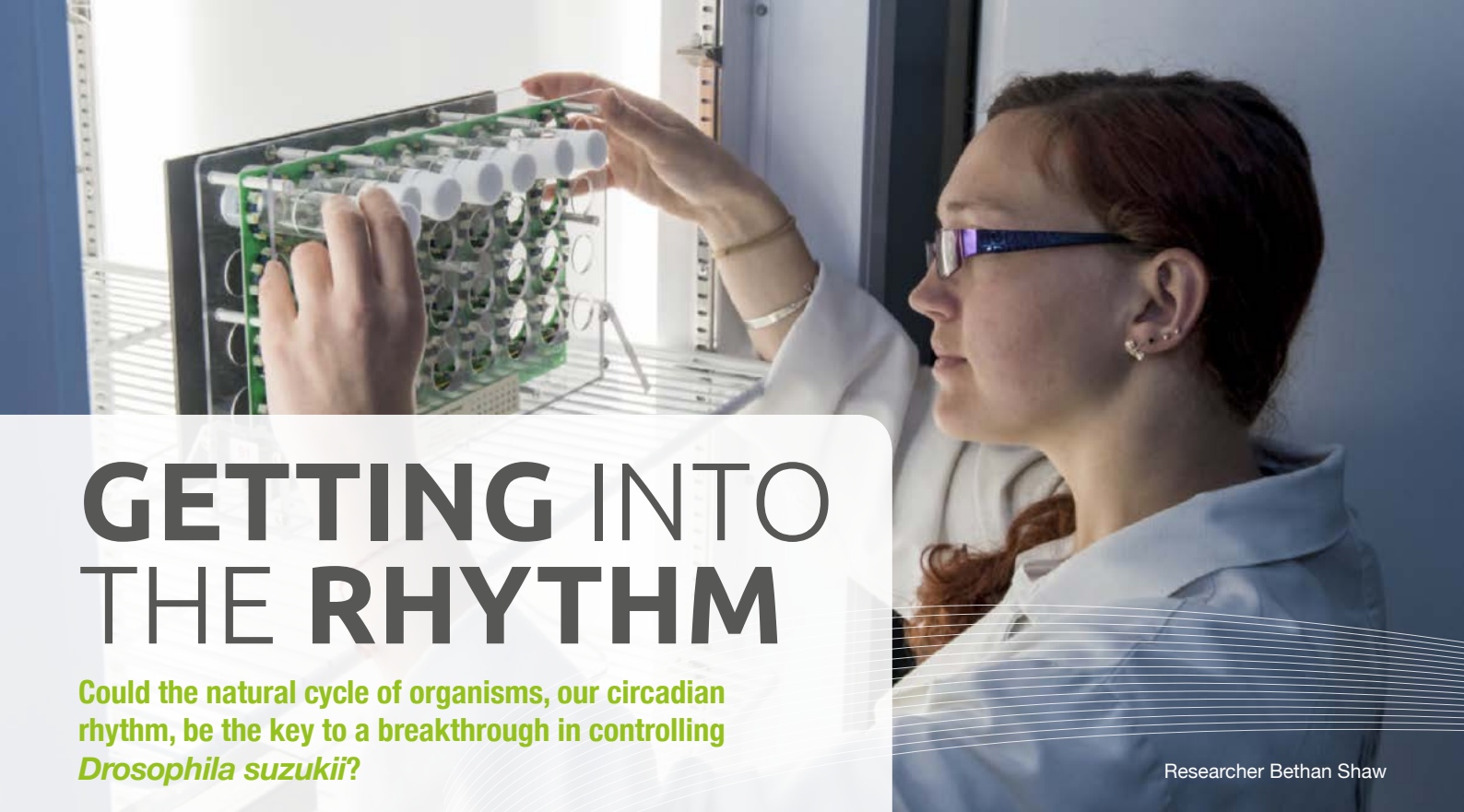
Tree Fruit Panel

Panel Chair: Rob Saunders, H L Hutchinsons

There are vacancies in the following areas of expertise:

- Tree fruit - South East
- Pears
- Stone fruit - West Midlands





GETTING INTO THE RHYTHM

Could the natural cycle of organisms, our circadian rhythm, be the key to a breakthrough in controlling *Drosophila suzukii*?

Researcher Bethan Shaw

Ever wondered why we so often crave routine? Or why you wake up at around the same time each morning and get sleepy at around the same time at night? For millennia it has been the same, not just for humans, but for many animals, and even plants.

These daily behavioural and physiological rhythms that dictate your life, such as activity and sleep, are exhibited by a wide range of organisms as a result of the interaction between environmental cycles and an internal timekeeping mechanism known as the 'circadian clock'. This clock can be regulated by environmental cues including temperature and daylight, and enables synchronicity to dynamic daily conditions.

While it contributes to less helpful phenomenon such as jet lag, it can be helpful when looking at the issue of pest control. In this case, studying the activity cycle of spotted wing drosophila (SWD) could reveal the best times to implement control measures, giving UK growers much-needed ammunition against this damaging invasive species.

Previously data on SWD and its activity has been collated mostly from European and American studies. However, the most prominent issue with this approach is that the environmental factors in the UK clearly differ from those on the continent and across the pond.

So, further insight into the daily behavioural and physiological rhythms of *Drosophila suzukii*, as determined by its internal circadian clock and environmental cues, should hopefully reveal the times of day when SWD is most active in the crop environment.

An AHDB project, co-funded by the University of Southampton, carried out by NIAB EMR PhD student Bethan Shaw aims to do just that; and so far the results have been interesting.

“Curiously, SWD in trials behaved differently depending on whether they were in a group or housed individually”

For example, the research has identified that the most active period for the female SWD to lay its eggs is during the daytime when the outside temperature reaches between 25°C and 29.9°C.

“During the cropping months female *D. suzukii* display a preference for egg laying in the warmest part of the day, typically early afternoon. However, when temperatures exceed 30°C egg laying is greatly reduced. In crops grown under tunnels it's not uncommon for air temperature to reach this.” explained Shaw.

Additionally, and somewhat curiously, the SWD in the trials behaved differently depending on whether they were in a group or housed individually. Though it is not yet clear as to how this will help with in-field application of control measures, it does perhaps provide a route for further research.

“As many groups are working on tackling *D. suzukii* it would be beneficial to have consistency in procedures while investigating behavioural rhythms. In order for research to be consistent and reduce conflicting results, we have been investigating the optimum laboratory parameters such as social housing and environmental conditions with the aim of producing a standard laboratory practice; then we can more accurately predict how wild populations will behave under different environmental conditions at different times of the year,” added Shaw.

It's hoped that as the project progresses such insights will allow for a method for targeting the pest at certain times of day, month, or when certain weather conditions are present, allowing UK growers to better protect against the pest's harmful effects.

AHDB project code: CP 142

Researcher: Bethan Shaw,
University of Southampton

AHDB lead: Scott Raffle

THE DROSOPHILA EFFECT

Might a meeting of minds spanning half the planet provide a solution to the problem of spotted wing drosophila?

Perhaps the most well-known example of chaos theory (sometimes known as the 'butterfly effect') is the idea that seemingly small events can have big unexpected results. The concept that most people associate with this theory is that of a butterfly flapping its wings on one side of the planet and causing a hurricane on the other.

So, is it possible then that a fruit fly flapping its wings in Japan could cause a metaphorical whirlwind in the fight against SWD here in the UK? A team at NIAB EMR, working in conjunction with The Tokyo University of Agriculture and Technology almost 6,000 miles away, aimed to do just that and create their very own 'drosophila effect'.

WHY WAS THE PROJECT NECESSARY?

As SWD is a non-native species, there is currently no natural predation so populations are able to build up rapidly. If left uncontrolled, it has the potential to render fruit unmarketable so growers have had to respond quickly to avoid crop losses. While there are a number of useful measures to help constrain the pest, growers are still seeking additional control options and one potentially effective system is the use of viruses specific to SWD. Although these offer good candidates for the development of microbe-based biopesticides, to date the viruses of SWD remain almost completely unstudied.

Conventional crop protection methods have many drawbacks and are difficult to implement with integrated pest management (IPM) programmes. So, if the research can lead to the development of an alternative IPM-compatible biopesticide specific to SWD then the benefits to growers and pest management professionals alike would clearly be enormous.

SO WHAT DID THE TEAMS DISCOVER?

A minor setback occurred initially when they discovered that one of their prime candidates, a Nudivirus infecting *D. Melanogaster* (more commonly known as the fruit fly), was shown to have a high mortality rate but unfortunately a time-to-death ratio of over two weeks – by which time the pest would have done damage.

However, while this project is merely the first step on the road to bioprospecting for viruses, it's hoped that the work will help to identify a viable, fast-acting pathogenic solution that will have a successful mortality rate and be commercially practical. Indeed, the teams – driven by UK-based researcher Nathan Medd – have identified 24 new viruses that affect SWD in the UK and its native home of Japan.

"We have discovered a host of viruses infecting *D. suzukii* in the wild. This is exciting because many of them are new to science and may potentially contain untapped potential as biological control agents. Isolation and production of viruses as viable crop protection products is difficult, but unlike 40 years ago when the first viral control agents were developed, we now have biotechnology on our side," explained Nathan.

Having sampled over 3,000 flies in three years to obtain their results, mainly using Metatranscriptomic screening, it's hoped that the project lays the groundwork for a viable long-term solution as other researchers now take up the mantle.

AHDB project code: CP 122

Researcher: Nathan Medd, Edinburgh University

AHDB lead: Scott Raffle

FACTFILE:

The spotted wing drosophila was first described in Japan in 1916, but not reported in the UK until almost 100 years later, in 2012.

KEY WORDS:

Pathogenic - something capable of producing disease (usually referring to a microorganism, bacterium, or virus).

Bioprospecting - the search for plant and animal species from which commercially valuable compounds can be obtained.

Metatranscriptomic screening - a genetic technique whereby all the genetic information in a sample is sequenced to identify any unseen pathogens and parasites.

PESTBUSTERS

As pesticide approvals become increasingly difficult, will biopesticides be the answer to successfully managing pests, diseases and weeds? In the first of our four-part series on their uses and benefits, we offer an introduction to these control alternatives

Since the 1950s, pest and disease management in the UK has primarily been based around a reliance on the use of synthetic chemical pesticides. However, the use of these as the backbone of crop protection is becoming ever more difficult, thanks in particular to increased resistance in target pest and disease populations, and the withdrawal of effective products based on 'old' chemistry because of new legislation.

As such, many progressive growers are now turning to Integrated Pest Management (IPM), a system in which a range of different crop protection tools are combined together in complementary ways. This includes the application of biopesticides with the aim of achieving effective control without harming the environment or increasing the chance of resistance.

According to Defra, there are around 67,000 different crop pest species – including plant pathogens weeds, and invertebrates – and together they cause about a 40% reduction in the world's crop yield. Therefore it is no surprise that the popularity of this form of crop protection is growing rapidly, with the EPA estimating that in 2012 (the most recent year for which there was data) over 18 million acres were treated with biopesticides in the US alone.

WHAT ARE BIOPESTICIDES?

Put simply, a biopesticide is any biologically-based crop protection agent based on living micro-organisms botanicals or semiochemicals. Biocontrol agents consisting of predators and nematodes are also important and more well established tools within the IPM armoury.

There are three main types of biopesticide:

- Bioinsecticides
- Bioherbicides
- Biofungicides

Bioinsecticides are those biological agents that are used to control harmful insects. This group contains the bacterial biopesticide most widely used against insect pests – *Bacillus thuringiensis* (Bt) – as well as semiochemicals, which are chemical compounds produced by one organism and which induce a behavioural change in other organisms. The most widely used semiochemicals that you're likely to have come across are insect sex pheromones, which are deployed in pest monitoring, mating disruption and trapping.

“There are around 67,000 different crop pest species which cause about a 40% reduction in the world's crop yield”

The second type, bioherbicides, are tasked with specifically controlling pest weeds that grow between crops, but without harming the valuable crop itself.

Biofungicides, meanwhile, consist of beneficial fungi and bacteria that attack and colonise harmful plant pathogenic fungi and bacteria. Many are naturally occurring in soil, making them an environmentally-friendly pest control tool.

AHDB, working in conjunction with The Warwick Crop Centre and others, launched the AMBER project (CP 158) in 2016 to increase awareness of the benefits and uses of biopesticides. Leading the project, AMBER's Dave Chandler, gave the following insight:

“An increasing number of biopesticide products are reaching the market, while at the same time the availability of conventional synthetic chemical pesticides is declining. On paper, biopesticides have some attractive properties for use in IPM, such as being exempt for residue testing, and very low re-entry intervals after spraying. However, because they are new products, growers do not have much experience yet of using them, and some growers have reported variable results. The purpose of the AMBER project is to develop sets of management practices that growers can use to improve the performance of biopesticides, which includes very practical measures such as optimising spray application, together with generating new information of application timing and compatibility with other IPM tools.”

With the uncertainty around the future approval status of conventional pesticides, biopesticides are becoming an ever more important option for UK growers. The challenge, however, is getting the most out of them in a cost-effective way.

In the next issue we'll tackle the pros and cons of using biopesticides and discover if they're right for you.

Contact: Dave Chandler, cropcentre@warwick.ac.uk



Biocontrol and biopesticides – what’s the difference?

Although from a scientific standpoint predators (as pictured here), parasitoids and nematodes are types of biopesticide, pesticide regulators do not class them as such. Why does this matter? Well, because biopesticides are subject to plant protection products regulations in the same way that conventional pesticides are, including getting authorisation from EFSA for use. Predators, parasitoids and nematodes, on the other hand, are not and require completely different types of regulation. This is also why you need pesticide handling certificates, such as PA6 and 7, in order to work with biopesticides.

The AMBER project has already highlighted the uncertainties growers face over correct application of biopesticides. Short term solutions will be showcased in two application events run by Silsoe College. The first, focussing on protected edible vine crops, will take place on 31 October.

VIVA VIVANDO

Newly UK approved fungicide Vivando will provide a complimentary option to Sporgon in the fight against mushroom disease. Ralph Noble and Andreja Dobrovin-Pennington explain further

With Brexit on the horizon and uncertain times ahead for many growers, reports of increasing resistance to the most commonly used fungicide for tackling wet bubble, dry bubble and cobweb disease will come as further worry to UK mushroom growers.

Sporgon (active ingredient prochloraz) was, until recently, the only approved fungicide for mushroom production in the UK, leaving the industry vulnerable to pathogen resistance. Further complicating the matter is the fact that the potential classification of prochloraz as an endocrine disrupter threatens its long-term availability. There is therefore an urgent need for new fungicide and non-chemical disease control methods for mushrooms.

However, there is hope via a fungicide called Vivando, which has been approved for some time on mushrooms in European countries, including France, Spain and Ireland. So, at a time when the UK seems to be determined to pull away from Europe, it could actually be

beneficial to look towards the Continent for a solution to the issue of disease in its mushroom crops. With the product now approved in the UK could Vivando provide a working solution?

A facet of AHDB's M 062 project has been conducting laboratory tests since 2015 to discover just that.

“At a time when the UK seems to be determined to pull away from Europe, it could actually be beneficial to look towards the Continent for a solution”

VIVANDO SUCCESS— IN COMPARATIVE TESTS

During the study, the researchers gave particular focus to dry bubble (caused by *Lecanicillium fungicola*), wet bubble and cobweb diseases (caused by

Cladobotryum species) which can result in significant losses in yield and quality through cap spotting. The currently approved Sporgon 50 WP is effective in tackling wet bubble (the less prevalent disease) but is weak in controlling cobweb disease. Additionally, since the 1990s there have been reports of resistance of *Lecanicillium fungicola* (dry bubble) to prochloraz in some cases in the UK, resulting in much poorer control of this disease with Sporgon. Therefore it is encouraging that the study found that in experiments conducted with mushroom cultivation in pots, Sporgon 50 WP (1g/m²) and Vivando (1ml/m²) were equally effective in controlling wet bubble, and dry bubble caused by prochloraz sensitive *Lecanicillium* isolates. However, Vivando was significantly more effective than Sporgon in controlling cobweb disease and dry bubble caused by the prochloraz resistant *Lecanicillium*.

To discover more about this project visit horticulture.ahdb.org.uk/sector/mushrooms



LATEST MUSHROOM UPDATES

BACK TO BASICS

As noted on the left, there are very few fungicides available for use in mushroom production. At AHDB we have therefore been working closely with Patrice Marchand from the French Research Institute for Organic Farming in putting together a basic substance application for use of sodium chloride (salt) for disease control in mushroom production. A basic substance is an active substance, not predominantly used as plant protection products but which may be of value for plant protection and for which the economic interest of applying for approval may be limited.

Salt joins a list of 16 other everyday substances including vinegar, sucrose, sunflower oil, and whey, not predominantly used for plant protection products, which are approved for use within the EU to help control a variety of pests, weeds and diseases on a range of horticultural and arable crops.

The approval for salt covers spot applications only. The full details of the approval will be made available on our website where information on all currently approved substances can also be found: horticulture.ahdb.org.uk/basic-substances

NEW BIOPESTICIDE SOLUTIONS

Biopesticides are considered to offer real potential for the mushroom industry. However, it is recognised that there are some specific questions that need to be addressed before they can be adopted more widely. The AMBER project will focus on the potential of biopesticides to aid control of the most important disease of cultivated mushrooms, the mycoparasitic fungus *Lecanicillium fungicola*. Small scale experiments are underway evaluating, initially, a range of potentially useful biopesticides and one basic substance to assess their effects. Six candidate biopesticides have been chosen by the research team in conjunction with the mushroom industry representative Jude Wilson and US researchers, based on current knowledge of the disease and the biology of the active substances. These include three micro-organism-based products and three botanical-based products. Targeted work with selected biopesticides will also be done to examine their effects on mushroom yield and on whether selected microbial biopesticides are able to proliferate within spawned mushroom compost. The outcome of this work should be extremely valuable to the industry and will inform the work of the EAMU programme seeking to obtain new approvals for mushroom growers.

KEY TERMS:

Here's a quick helpful terminology guide:

Diseases:

- *Lecanicillium fungicola* = dry bubble disease
- *Mycogone perniciosa* = wet bubble disease
- *Cladobotryum* = cobweb disease

Fungicides:

- Sporgon - active ingredient is 'prochloraz'
- Vivando - active ingredient is 'metrafenone'

AHDB project code: M 062

Project leader: Ralph Noble, NIAB EMR, Pershore Centre

AHDB lead: Gracie Emeny



SEEKING TO REGAIN ABSOLUTA CONTROL

With incidence of *Tuta absoluta* infestations increasing, Dr Rob Jacobson, Charles Grant and Chris Bass take a look at the AHDB projects working to defeat it once and for all

Back in 2013, AHDB projects PC 302 and PE 020 (along with associated studies) had developed a completely new Integrated Pest Management (IPM) strategy, based around the predator *Macrolophus pygmaeus* that had all but removed the pest *Tuta absoluta* as a threat to tomatoes.

British growers understandably thought they had it firmly under control but it fought back with a vengeance in 2015 and 2016. *T. absoluta* began to display resistance to one of the key insecticides of the IPM strategy, spinosad, followed by confirmation that treatment failures had occurred in another important insecticide, chlorantraniliprole, in both Italy and Greece (with suspected resistance in UK populations also – though this is still to be confirmed).

RENEWED ACTION NEEDED

These control failures made it clear that the British tomato industry had to take measures to remain one step ahead.

In response, AHDB launched a studentship (project CP 162), and projects 'PE 028 – *Tuta absoluta*: Investigating resistance to key insecticides and seeking alternative IPM compatible products' and 'PE 032 – Tomato: Addressing important knowledge gaps in the *Tuta Absoluta* IPM programme'. With support from the Tomato Growers Association (TGA) these projects aimed to improve understanding of the mechanisms that influence insecticide resistance in *T. absoluta*, with the overall aim of prolonging the active life of those insecticidal components of the IPM programme which were already showing signs of failing.

Charles Grant became the PhD student at University of Exeter, under the supervision of Professor Chris Bass and with additional practical guidance from Dr Rob Jacobson of the TGA Technical Committee.

The student's first task was to re-test samples of the UK *T. absoluta* populations to determine whether resistance declined in the absence of spinosad selection pressure. So far this does not seem to be the case, but studies continue.

Charles' work has already identified the molecular basis of spinosad resistance in the UK *T. absoluta* populations. One immediate benefit for the industry is the development of a molecular test for spinosad resistance which will replace the previous bioassay and reduce the reporting time to growers from eight weeks to just one week.

With the help of Dupont, TGA trials have shown that the efficacy of another of the insecticides used in the IPM strategy, Steward (indoxacarb), can be greatly enhanced by incorporating the adjuvant Codacide in the spray – believed to aid the penetration of the active ingredient into the leaf where it has a much greater impact on mining caterpillars.

PE 028 identified two insecticides (azadirachtin and emamectin benzoate) from hitherto unused IRAC Classification Groups which could replace the insecticides already compromised by resistance. It has been agreed that these insecticides will be tested against *T. absoluta* in AHDB's SCEPTREplus programme.

“ Growers thought they had it under control but it fought back with a vengeance ”


MATING DISRUPTION AS PART OF THE IPM PROGRAMME

The concept of mating disruption as a component of the *T. absoluta* IPM programme was first introduced to the UK tomato industry by Dr Jacobson at the 2011 'Tomato Conference'. It involves artificially saturating the atmosphere in the glasshouse with a synthetic version of the sex pheromone that is naturally produced by female moths to attract males prior to copulation. As a consequence, the males become confused and are unable to find the females – so they do not mate. The mating disruption product, Isonet-T, was approved for use in the UK at the start of the 2017 growing season.

The mating disruption technique had the potential to slow down *T. absoluta* population growth in the early part of the season while *Macrolophus pygmaeus* were becoming established. Indeed, unpublished reports from mainland Europe, where it had been used in 2016, were very promising. However, a peer reviewed study from the University of Liege indicated that some female *T. absoluta* exhibited parthenogenesis (ie production of eggs without mating) which would clearly compromise the efficacy of this system. Crop-scale trials were urgently required to determine the true potential of this product for UK growers.

AHDB project PE 032 began at the start of the 2017 growing season with a mating disruption trial hosted by Jan Bezemer & Sons, North Yorkshire. The pest had been present in these crops at the end of the 2016 growing season and male moths continued to be caught in pheromone-based monitoring traps in the empty glasshouses during December. Isonet-T dispensers containing the sex pheromone were placed in crops in early January, either one week before or two weeks after the arrival of the tomato plants. Where placement was delayed by two weeks, a few active *T. absoluta* mines were seen during the first four weeks of the crop, but none thereafter. Otherwise, no active mines were found during the following 22 weeks in any of the treatments. By that time, *Macrolophus* were well established and capable of controlling any subsequent *T. absoluta* infestation. The full trial results, which were nothing short of spectacular, will be reported in detail at the end of the 2017 growing season.

Several TGA members who already had significant *T. absoluta* infestations in their crops in February 2017 were watching our trial with interest. They all opted to place Isonet-T dispensers in their crops despite our belief that they'd already passed the optimum time for treatment. However, their results were, without exception, beyond all our expectations. The pest population growth stopped immediately and crops gradually 'cleaned up' as the old damage was removed by routine deleafing. Only one of the growers



“Despite our belief that they’d already passed the optimum time for treatment, their results were beyond all our expectations”

saw any resurgence of *T. absoluta* by August 2017 and that was only in one of his many glasshouses.

Dr Jacobson said, “*Tuta absoluta* is the most challenging pest I have encountered in an entomological career spanning more than 30 years. The pest arrived in Spain in 2006 and its lifestyle was so well tuned to tomato production and international trade that it swept across Europe. It has a remarkable ability to adapt to overcome our new control measures. It’s clear that our industry must continue to strive to keep one step ahead.”

GOING FORWARD

Despite these truly spectacular results, it’s important that we do not dismiss the reports of parthenogenesis. It’s quite possible that our use of the mating disruption technique could select for a small proportion of female moths that exhibit parthenogenesis – just as the use of certain insecticides can select for resistance to that particular chemistry. The team at Exeter University are beginning to study parthenogenesis with particular reference to the selection process in *T. absoluta*. Meanwhile, it’s important that UK growers only use Isonet-T as part of an IPM programme with equal consideration given to other biological, physical and insecticidal products.

AHDB project codes:
CP 162, PE 028, PE 032

Key staff: Dr Rob Jacobson,
TGA Technical Committee

Prof Chris Bass,
University of Exeter

Charles Grant,
University of Exeter

AHDB lead: Gracie Emeny



A NEW LOOK FOR AN OLD FAVOURITE

The biennial UK Onion & Carrot Conference takes place in Nottingham for the first time this November, and becomes a one day event, aiming to be bigger and better than ever

“The first set of results from the new SCEPTREplus project will be presented”

A view of the future will be presented to delegates at the latest instalment of the biennial UK Onion & Carrot Conference.

Taking place in Nottingham for the first time, Andrew Francis, Senior Farms Manager at Elveden Farms Ltd. based in Norfolk, will delve into what the future holds for the sector and how we can all help to shape it and be part of it.

The conference and trade exhibition will be held on Tuesday 14 November 2017 and is generously being sponsored by Bayer and Elsoms Seeds/Bejo.

After several years of holding this industry event in Peterborough over two days it was decided to move the event around the growing region and change the format to a one-day event.

There will be a series of technical and marketing talks relevant to both crop sectors, with a break-out session in the morning where crop specific agronomy presentations will be given. The event will conclude with the well supported conference dinner, which provides a perfect occasion for networking with

industry colleagues from home and abroad. In 2015 delegates from over 10 countries attended.

The programme of technical presentations will also include an update on agri-mechanisation research projects from the University of Lincoln and Harper Adams University College. AHDB Horticulture project FV 391a ‘Carrots: Development of artificial inoculation techniques for cavity spot caused by *Pythium violae*’ will be summarised by Kat Hales. The first set of results from the new SCEPTREplus project will be presented to update on any new potential actives suitable for the allium crops.

John Clarkson of Warwick Crop Centre will give a summary of the new project FV 452 ‘Biology and control of Fusarium diseases across multiple crop; phase one – development of molecular tools to identify and quantify multiple Fusarium species’.

All conference information including bookings can be found on the website www.onionandcarrotconference.co.uk



BRITISH ONIONS



TECH IT TO THE MAX

Technology is often hailed as the way forward, but choosing what to implement can be tricky. The AHDB Herbaceous Perennial Technical Discussion Group visited two leading nurseries to discover how they've implemented tech change for the better

Innovation in business generally refers to changing processes or creating new products and concepts. This could mean implementing new ideas, creating dynamic products or improving your existing services. Innovation has been synonymous with horticultural growers, constantly adapting, renewing business models to stay fresh and competitive.

Earlier this summer, the AHDB Herbaceous Perennial Technical Discussion Group had the opportunity to visit two nurseries that have embraced a holistic approach to automation and mechanisation, taken bold decisions and successfully moved their businesses forward.

The first visit was to Lansen Nursery, wholesalers of outdoor plants and operated by Jan Lansen since 1990, while the second visit was to Neame Lea Nursery, one of the largest ornamental plant producers in the UK, in terms of turnover, which has been revitalised under the vision and leadership of David Ball.

REINING IN THE COSTS

“We started with only perennials, supplied to the landscape sector, but by the 2000s we started to aim for the main supermarket outlets, expanding from 1.5ha to 9.5ha during this time period,” said Jan Lansen.

Today the business grows between 1200–1400 plant varieties, primarily herbaceous lines, but also some hardy nursery stock and annual bedding. Through the adoption of a whole nursery transport system, based on mobile benching, plants can be moved seamlessly around the entire nursery during the production process, saving time and reducing the labour required to undertake this task.

Key production stages such as potting, trimming and plant preparation prior to dispatch are carried out on the benching. When plants are placed onto the flood and drain production beds, operations (such as spraying) are undertaken via a mobile boom unit, based on a powered trolley sprayer with a fold-down boom attached.

Over at Neame Lea they showcased all of their latest innovation, including automated pot/tray filling, transplanting and spacing equipment, which helps to ensure the ‘lowest cost of production’.

“Before we really started on this new path we didn’t realise the savings we could make,” said David Ball, explaining; “We were wasting 85% of our water on the nursery, but now with a rain water collection system and our in-house reservoir we are self-sufficient. If I had bought this in, it would have cost over £100,000.”

He continued; “The plan is to streamline the process to achieve the lowest cost of production for large volumes of plant material.”

The overall aim is to combine all the individual pieces of equipment into a system that flows logically and is easily managed, without simply moving any bottleneck along the production line.

STAYING GROUNDED

Billions of pounds are spent each year across the UK on gym memberships, spa treatments and vitamin supplements, all in the name of staying healthy. But just how much do you spend on keeping your soil healthy and fighting fit? Here's why you should perhaps rethink your (soil) fitness regime



Soil, dirt, ground, organic matter.

It has many names, both scientific and colloquial, but whatever moniker you choose to bestow upon it there's no doubting that it is arguably the most vital component in most growers' arsenals. So it's not surprising then that keeping yours in tip-top shape is of vital importance if you want to achieve success. The GREATsoils programme exists specifically for the purpose of helping you with that task. But what is it and how can it help?

WHAT IS GREATSOILS?

GREATsoils stands for 'growing resilient, efficient and thriving' soils.

As part of the programme, AHDB Horticulture has funded a specific three-year project, which started in early 2015. Led by the Soil Association and involving the Organic Research Centre and Earthcare Technical, it was founded with the aim of inspiring and supporting fruit, vegetable and salad growers to develop the abilities and confidence to assess the health of their soils and take practical action to improve their management strategies.

WHAT IS MEANT BY SOIL HEALTH?

Soil health can be defined in many ways. A frequently used definition might be, "the capacity of soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and promote plant and animal health". Factors which affect soil health include physical parameters such as soil structure; chemical parameters such as crop nutrient indices and soil organic matter content; and biological parameters such as earthworm numbers. These can all be affected by the ways in which we manage our soils. The term soil quality is sometimes used interchangeably with soil health, but it is more usually thought to include parameters that cannot be changed, such as soil depth and soil texture (ie the relative percentages of sand, silt and clay).

WHY IS SOIL HEALTH IMPORTANT FOR GROWERS?

Soil health is critically important to growers because there is a direct relationship between functional, healthy soils and reliable good yields of quality crops. In fact, the Environment Agency estimates the costs of organic matter decline in English soils due to cultivation to be about £82 million per annum¹. It therefore has a clear impact on profit margins. As margins are squeezed, growers are keen to ensure they can get consistently good yields of marketable crops, yet many have become aware that their soils have suffered following years of intensive cultivations with few (or no) organic matter returns. Many growers now see the value in measuring soil health in order to gain a better understanding of their soils and to help them choose appropriate management strategies to improve them. In short, soil health has a clear impact on farm profitability.

Steve Nickells of Valefresco said, "We need to remember to treat soil as a living system. Nurturing that system is especially important for intensive cropping; we must give back not just take from the soil."

HOW DO WE MEASURE SOIL HEALTH?

Soil health can be measured in a variety of ways. The most commonly used and potentially most useful methods include soil structure assessment using standard systems such as VESS (Visual Evaluation of Soil Structure) method, earthworm counts and laboratory testing of major, secondary and trace nutrient availability, soil organic matter content and soil respiration. Owner of Tolhurst Organic, Iain Tolhurst, said, "The earthworm counting is a great way to assess soil health, and one that can be learned quickly by growers."

All growers are advised to test their soils regularly to assess crop nutrient availability. However, growers should be aware that this is only one basic step

towards understanding the potential of their soils. Many are now realising the benefits of a much wider soil evaluation regime, including investigations into soil structure, soil organic matter and biological tests.

WHAT HAS THE PROJECT FOUND SO FAR?

A key aim of this project is to involve growers from throughout the UK in evaluating a wide range of practical soil health assessment techniques in order to choose the best ones for use on their holdings. A literature review looked at soil assessment techniques used throughout the world. Surveys were then sent out to growers and agronomists and four regional consultation workshops were held in Scotland, East Midlands, West Midlands and Southeast England to gain the views of growers on these assessment techniques.

Recommendations based on information gained in these workshops have now been summarised in an AHDB leaflet entitled 'Soil Assessment Methods' which aims to help growers choose soil health assessment techniques that are most relevant to them. You can find the leaflet here – horticulture.ahdb.org.uk/publication/soil-assessment-methods

Meanwhile in Fife, Scotland, growers (including several producing crops for Kettle Produce) are evaluating the impact of green compost with and without straw on a range of soil health parameters. They've found that soil respiration was 27% higher in cropped soils where straw and compost had been incorporated prior to ploughing (in comparison with soils where no organic materials had been used).

Discover more online:
www.ahdb.org.uk/greatsoils

SOURCES:

1 - Environment Agency (2007): The Total External Environmental Costs and Benefits of Agriculture in the UK.

GREATSOILS



“Soil health
has a clear impact
on profit margins”

GET INVOLVED

Why not join us at one of the following upcoming workshops to find out more?

17 October 2017: GREATsoils one-day workshop (leafy salads) – Intercrop, Kent

7 November 2017: GREATsoils with an emphasis on precision farming for horticulture – Yorkshire

16 May 2018: Greatsoils PfHort Controlled Traffic Farming Demonstration Trial – Herefordshire

Visit www.ahdb.org.uk/greatsoils for details.

3 TOP TIPS FOR GROWERS

- 1) Take the time to use a spade on your holding. By understanding the texture and structure of your soil, you will better understand its potential and its limitations
- 2) Do take time out to consider testing for more than just soil nutrient status. Other parameters – such as soil organic matter content and earthworm counts – can provide useful information
- 3) Most soils could benefit from additions of organic matter, but that is not always easy to achieve. Consider all the options which you have in order to increase your soil organic matter content; achieving an improvement might be easier than you think

INSIGHT INTO AHDB PROJECTS

FINDING FUTURE CONTROLS FOR FUSARIUM – NEW PROJECT

Cathryn Lambourne explains how scientific advances are enabling AHDB to seek new ways to limit the damage that basal rot can cause on onion, leek, narcissus and column stocks

Fusarium can cause some of the most devastating diseases in agriculture and horticulture, affecting a wide range of crops from cucumbers to cereals. Pathogenic species can cause vascular wilts or crown and basal rots in horticultural crops, and head blights in cereals resulting in economically damaging losses.

Fusarium oxysporum, one of the more pathogenic species, has long been distinguishable from other species; however, techniques to enable scientists to identify the different ‘special forms’ of this species and their relative pathogenicity have only recently been developed.

The new techniques will help researchers untangle the role played by the many species and ‘special forms’ of Fusarium in horticultural crops and aid the development of integrated disease management strategies.

THE HOPE

This project aims to develop a diagnostic DNA test for use on onions, narcissus,

leeks and column stocks to test seed, sets, bulbs, plants or soil to identify different pathogenic forms of *Fusarium oxysporum* and assess disease risk in nurseries, field or in store.

Understanding Fusarium communities in soil may well offer another tool to help with control. Research has identified that some Fusarium species grow happily on crop roots without causing harm, but leave high levels of inoculum in the soil which may be pathogenic on following crops, so managing crop rotations could be a hugely important control option.

WHY NOW?

With recent advances, such as whole genome sequencing, researchers are now able to identify and study different forms of Fusarium, which hasn’t been possible before.

The knowledge from this project will underpin a longer-term programme of research to help develop new management approaches for use across multiple crops.



FV POBOF 452 Fusarium:

Investigations into the control of basal rots in crops

Term: April 2017 to September 2018

Project leader: John Clarkson, Warwick Crop Centre

AHDB lead: Cathryn Lambourne (pictured)

NOVEL APPROACHES TO MANAGING LEAF AND BUD NEMATODES – FINAL REPORT

New products identified to reduce leaf and bud nematode damage on ornamental crops

Leaf and bud nematodes (LBN) can cause serious and costly foliar damage to over 700 species of hardy nursery stock plants. If buds or young leaves are infested, development can be affected, leading to the plants becoming unsaleable.

New plant protection products have now been identified to potentially provide growers with more control options.

The results show Movento (spirotetramat), Dynamec (abamectin), HDC 069 (plant extract) and HDC 071 (elicitor) used in a foliar application programme resulted in effective management of LBN on a range of ornamental plants.

The treatments, on both plants showing nematode symptoms and on plants initially free from infection, limited nematode multiplication and led to improved post-treatment appearance for the plants compared with untreated plants.

CP 104: Novel approaches for the management of leaf and bud nematodes in hardy nursery stock

Term: October 2013 to September 2016

Researcher: Idowu Rotifa, SRUC Edinburgh

AHDB lead: Georgina Key

Georgina Key, resource management scientist, AHDB:

The new plant protection products identified in this research could be of great value to growers, however consideration should be given applying these within integrated pest management (IPM) programmes.

Cultural control methods are an important part of IPM and the most effective of these is a programme of high crop hygiene as foliar nematodes can survive for several years in infested dried leaf debris. Growers should:

- Remove and destroy infested plants and debris
- Avoid replanting in contaminated soil
- Sterilise pots and equipment
- Avoid use of overhead irrigation and misting systems where possible as they create ideal conditions for nematode infection



**SUB ZERO
STORAGE**

DON'T IGNORE YOUR COLD STORE

Are you giving energy and financial savings the cold shoulder by neglecting your cold store management?

When it comes to improving your business energy efficiency and annual spend, reducing heating costs is probably your biggest concern; however, your cold store deserves equal consideration. Across the horticulture sector, cold stores are used for a wide variety of purposes, such as reducing temperature of crops and short term storage, as well as holding, manipulating and scheduling ornamental crops. This ambidexterity of uses therefore begs the question; have you overlooked the potential savings in both energy and money that your cold store could offer?

“A potential use for this wasted heat could be to warm office spaces, offsetting heating costs”

The amount of energy required to operate cold stores is, naturally, related to how good the equipment is and how efficiently the store is operated. In order of simplicity, the five main areas affecting cold store efficiency are:

- 1) Control and management
- 2) Air movement
- 3) Air leakage
- 4) Insulation
- 5) Equipment type

COLD STORE EFFICIENCY TOP TIPS

If you are experiencing low system efficiency, or just want to ensure your system is set up well, here are some simple techniques that can be employed to help improve efficiency and reduce costs:

- Install several temperature sensors at various positions and heights within the store to monitor conditions. Addressing issues in warmer areas will ensure that you don't overcool other parts of the store and will save energy
- If produce is continually being taken in and out, use fast-acting doors or strip curtains to keep the cold air in
- Check for air leakage around doors, louvres and other openings; use a thermal imaging camera or smoke testing to highlight problem areas.
- Check evaporators and condensers are not obstructed, eg by dirt or ice
- Ensure air directed to cool the external condensers is as cold as possible. Warm air exiting the condenser should be diverted away from the inlet; consider a simple baffle design to deflect it
- Use ambient cooling with fans and louvres when outside conditions are cooler than required inside
- Check refrigerant levels and ensure no leaks in the system

- Use water to cool refrigerant instead of air, allowing 10°C cooling year round, potentially improving efficiency by up to 20%

OTHER CONSIDERATIONS

Where fluorinated gas refrigerants have been used historically, legislation over their environmental impact means systems using Glycol are now coming more popular. However, these are not without issue. Glycol mix is delivered at warmer temperatures than direct refrigerants are capable of, meaning more fan units are required for the same cooling capacity. The waste heat from these systems can be recovered more easily; a potential use for this 'wasted' heat could be to warm office spaces, offsetting heating costs, while also reducing electricity consumption of the cooling system.

If you would like more information on improving your cold stores energy efficiency then read our recently published Technical Update 'Keeping in the cold', which you will find on the GrowSave website www.growsave.co.uk/technical-updates

grow save
helping horticulture save energy

SETTING A NEW STANDARD

New Red Tractor standards kick in this month (October), but do you know how they will affect you?

One of the most commonly recognised symbols on food packaging for British consumers is the 'Red Tractor' Assured Food Standards logo. Therefore, with most supermarkets expecting this accreditation as standard from UK producers, it is no surprise that staying on top of any changes to the accreditation is vital for UK growers. So, with new standards about to kick in that you'll have to adhere to, what has changed and why?

WHY HAVE THERE BEEN CHANGES?

Every three years the assurance body conducts a review to ensure that on-farm standards match consumers' ever-evolving expectations. The process means that food carrying the logo has been produced in a way that shoppers want, giving it a real point of difference on the shelves.

An industry consultation was held late last year and growers were sent the new set of standards in July.

Food safety has been the main focus of the technical advisory committees who discuss, advise on, and help shape what the fresh produce standards should demand.

The scheme's fresh produce chairwoman, Dr Louise Sutherland, explained that: "Much of the focus is on food safety and is about having more preventative actions to produce safe, uncontaminated food that is free from foreign bodies."

HOW WILL THIS AFFECT GROWERS?

For any grower and packhouse operation supplying a retailer, the impact is likely to be minimal. However, Dr Sutherland says that the review of the fresh produce scheme has resulted in some significant changes that growers need to understand.

Among the important changes is that standards are now more crop-specific.

"There are four category levels to crops, each with its own risk assessment; what you do for ready-to-eat spinach will be different to what you do for potatoes, for example," Sutherland explained.

"The standards are specific, clear and detailed so, regardless of what you are growing or packing, you know what you are being audited against."

For more information, visit www.redtractor.org.uk

What are the main changes to the standards?

1) PREVENTING PRODUCT CONTAMINATION

The main pillars of the revisions sit around more detailed risk assessments, putting in controls in packhouses and fields that will prevent product contamination.

2) WATER USE

There must be a documented water risk assessment which relates to crop category and covers all water used in crop production.

3) METALDEHYDE

In line with the Metaldehyde Stewardship Group (MSG) guidelines, a standard has been introduced requiring scheme members to only use Metaldehyde in a manner that reduces the risk to water, birds and small mammals.

4) RODENTICIDE USE

Permanent baiting must not be routinely undertaken and baits can only be sited where evidence shows they are being continuously effective. A site survey and risk assessment of watercourses and populations of non-target species should also be carried out and recorded before treatment.



ON THE RIGHT WAVELENGTH

As technology advances and the price of equipment comes down, will hyperspectral imaging lead to early, affordable detection of stress in fruit crops?

Stress. Whether human, animal or plant, it seems almost everything experiences it. The negative effects stress has on health are also well-documented, and for horticultural growers this is a huge incentive to identify it early in their crops and mitigate its effects.

While many growers are currently well-versed in looking for stress in their crops, the time and labour costs that are involved in such a process, coupled with the level of subjectivity, means that any technological solution would have serious financial and efficiency rewards.

An AHDB co-funded project, 'SF 144 – Early detection of stress in strawberry plants using novel image analysis techniques', set out with the aim of understanding how one of these technologies – hyperspectral imaging – could be used to identify stress in plants before visual signs were apparent. The project analysed hyperspectral images of glasshouse-based strawberry crops during a period of stress, in order to learn to detect the differences between healthy control plants and plants which are stressed or diseased.

Initial results indicated a potential, yet subtle difference in the reflectance curves of plants affected by early stages of drought. The final stages of the project will look to incorporate the novel imaging and analysis techniques to improve stress prediction from such image data.

“While having potential, it is clear that hyperspectral imaging is not yet a point-and-click technology, and care and expertise are required when working with the data,” said research student Amy Lowe.

Careful data capture is required to reduce the noise in the dataset to enable useful predictions to be made, but encouragingly the technology shows promising signs when it comes to detecting stress earlier than can be done with the naked eye. However, the technology is perhaps less portable and affordable than it would need to be at present for most growers to experience any significant economic return. Fortunately this is constantly and rapidly advancing to the point where it may soon be a viable economic option across the industry. The future is almost here!



AHDB project code: SF 144

Project leader: Dr Andrew French, University of Nottingham, in collaboration with Dr Nicola Harrison, AHDB

WHAT IS HYPERSPECTRAL IMAGING?

Hyperspectral imaging involves bouncing light off an object (in this case a plant) and recording the levels that are reflected back. In this way it is able to capture how different regions of a plant reflect the light differently across a broad spectrum of illumination. When these different sections reflect different levels of light back, the resulting variations can be analysed to indicate certain plant responses to stress.

Usually colour digital images are created by combining three wavelengths of light – red, green and blue – whereas hyperspectral images usually consist of several hundred narrowly focused samples from across the whole spectrum of light. For the data collected in this research studentship, the wavelength range spans the visible and near infrared section (400nm to 1000nm; see Figure 1).

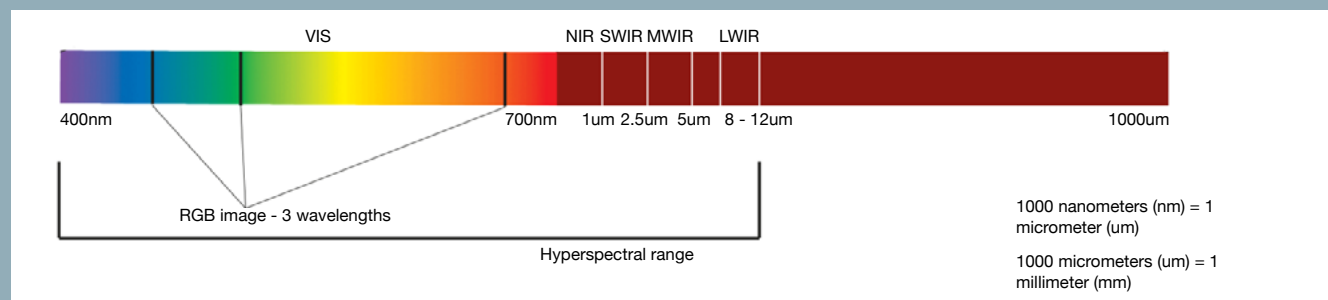


Figure 1. Range of spectrum captured by typical hyperspectral sensors

A CUT ABOVE

The potential for UK-grown ornamental grasses as bouquet fillers and the latest research to help stocks growers escape soil-borne Fusarium were some of the talking-points at this year's National Cut Flower Centre open day in August, as Spence Gunn discovered



“Collison believes ebb and flood looks like the way ahead for stocks”



If the level of interest being shown by growers and packers in the National Cut Flower Centre's trials of ornamental grasses is anything to go by, the crop could quickly become one of the programme's most successful 'new' product lines it has ever tested.

Last year saw the first season of trials of a wide range of species and varieties for their potential as fillers in bouquets of British flowers, grown either from plugs or direct seeded, both in tunnels and outdoors at the centre's Rookery Farm site in Lincolnshire. They all grew well, yielding a variety of head forms.

"For this season we've narrowed down the range, concentrating on those that the industry felt had the most promise," project manager Lyndon Mason told growers at the trials open day in August. "From their performance so far this year *Panicum miliaceum* and *P. elegans* 'Frosted Explosion' look particularly interesting."

PRODUCTION SCHEDULING

Although attractive, others in the trial may be less successful commercially. Brome, for example, is proving to be prone to powdery mildew, while sorghum is simply too big.

Another aspect of the grass trials this year has been to explore production scheduling. All varieties have been grown either from plugs – planted at 25 plants per m² in weeks 18, 25 and 30 under protection, or weeks 18 and 25 outdoors – or direct seeded at three rows per metre-wide bed in week 14.

The first planting was flowering in week 28; the week 25 planting was still cropping at the time of the open day. "As last year, they've all grown well from all the planting or sowing dates," said Mason. "For the trials we've used a one-month interval between plantings but commercially you'd probably want to go for a two-week interval for continuity of supply."

Jayne Winter, product manager for JZ Flowers, said that having seen the trials at Rookery Farm, the packing and marketing company was looking at sourcing British-grown grasses for next year. "Up until now we have relied on imports but the trials show they can be grown here with sequential planting to provide the continuity the market needs," she said.

"We are looking at the potential for next year, initially as trial crops with some of the growers we work with, and putting bouquets together to look at the best ways to use them."

Danziger's new *Scabiosa* 'Scoop' series, which had also generated a lot of interest when trialled at the centre for the first time last year, suffered from the hot weather in June. "They budded early and

had to be pinched twice, and have been generally less vigorous," said Mason.

He said that although yields were good from the various 'Scoop' varieties and the HilverdaKooij *Scabiosa* trialled alongside them this year, the crop could prove labour-intensive to harvest. "They are lovely flowers but need to find their market niche," he said. "Picking can cost five to 10 pence a stem so you really need to see a return of around 20p. Having said that, some businesses have been growing it this year."

Gomphrena, the *Veronica* 'Skyler' series and a new hardy *Ranunculus* 'Rococo' from Plants for Europe all showed promise in this year's trials.

Gomphrena has good potential as a bouquet filler, says Mason, who suggests that of the two types in the trials the Haageana series is better suited for cut flower production, thanks to its stem length. The ranunculus was planted in mid-October 2016 and overwintered in an uncovered tunnel. The cover was replaced in early April. Stems were strong and tall and ready from week 17 onwards.

The veronica trial compared an overwintered crop with a new planting made in week 18. The overwintered plants flushed first in weeks 22 to 24 and again in week 31 while the new plants cropped in weeks 28 to 30. "We had very good quality stems from the first flush of these but the second was less good – they probably should have been thinned," said Mason. "You'd need to look at ways to extend the short cropping period to make these viable commercially."

FUSARIUM AND HYDROPONICS

Over the past three seasons the National Cut Flower Centre has been investigating hydroponic production as a means of 'escaping' Fusarium.

Mason told growers that trials of deep and shallow pool systems in 2015 and 2016 had proved the concept. "Crops of aster, chrysanthemum, lisianthus and statice all grew well in the deep pool system," he said. "The key issues for column stocks were found to be the high level of oxygenation required in the water and the need to provide support for the stems."

More recently, trials have looked at growing stocks in expanded clay pellets in tulip pin trays, which Mason said works well provided they are fully drained to maintain oxygen levels around the roots. "Just one centimetre of water is enough to damage the plants," he said.

Trials this year have focused on producing stocks with ebb and flood irrigation – either in packs or pots on standard ebb and flood benches at Neame Lea Nursery, Spalding – or rooting the plants directly into a tray of clay

pellets, at National Cut Flower Centre steering group chairman Phil Collison's nursery, in a set-up designed by Collison and his staff.

"The pack and pot trial yielded a decent crop despite quite tight spacing," said Mason. "The trials with the prototype pellet system compared two pellet sizes and helped us pin down an EC of 2.5mS/cm for the nutrient solution."

"It successfully produced a Fusarium-free crop but, as with the other hydroponic systems, we need to find a way to support the stems."

Collison said he believes ebb and flood looks like 'the way ahead for stocks' as it offers the best way of ensuring good oxygenation of the roots. "Obviously the economics don't stack up to install a system just for stocks but they would where it is already in place on a nursery and the stocks could be grown to fit in with other crops, such as tulips."

Meanwhile, the soil in one of the National Cut Flower Centre's tunnels has been deliberately infested with the stocks-specific strain of fusarium this year to provide a site for future research on control methods and diagnostic tests.

Innovative new techniques such as band-spraying and electric weeding are already showing promise for vegetable and fruit crops in trials in AHDB's SCEPTRE and SCEPTREplus projects, and so could help solve some of the most challenging weed control issues for flower growers.

ADAS weed control specialist John Atwood told growers at the National Cut Flower Centre event that band-spraying would be worth investigating for sweet william, for instance, for which there are few effective and crop-safe pre-emergence herbicides. One treatment is applied along the drill row with a second 'stronger' treatment between the rows, choosing a product that doesn't move laterally in the soil. It would require a GPS-guided sprayer, however, as you can't line up on the rows accurately enough without one.

Electric weeding could be a solution for perennial weeds in crops such as peony as suitable equipment is becoming available. "There is a good height difference between peony and weeds such as perennial thistle so the electrode can brush the weed and miss the crop," he said; "The current kills the weed's root as well as the top."

WHAT'S IN STORE FOR YOUR ONIONS?

NIAB's Bruce Napier takes a look at how you can improve the storage of your onions

“ A 40% difference in storage performance would equate to the equivalent of 24t/ha extra lost in the poorest performing varieties ”

The UK grown area of onions is between 9,000 and 10,000 hectares, yielding approximately 440,000 tonnes. On average 70% of the area grown is drilled onions which are likely to be stored for between three and nine months from harvest. Improvements in varieties and in storage methods mean that UK onions are generally available in excess of 46 weeks of the year.

AHDB have jointly funded onion variety performance trials over several years, the most recent of which is FV 348d 'Onions – independent assessment of field and storage potential of varieties'. One of the primary objectives is to assess the storage potential of new varieties. There's nothing more soul-destroying than seeing all your efforts going to waste so it is vital to ensure that the harvest yield is maintained in store.

Field trials are drilled on two sites courtesy of Raker Farms and P.G. Rix Farms; one in light Breckland soil and the other a heavier silt, giving different environmental conditions and disease pressures. Varieties are tested over a number of years to give seasonal variation and hopefully show consistency in performance.

Trial material is not treated with growth regulator (maleic hydrazide) and is stored in ambient conditions through to the end of May to give the extremes of varietal differences. A sub-sample is kept in a controlled environment (CE) store until June, reflecting what is becoming the standard storage method for much of the UK crop.

The onion samples are selected from the graded 60–80mm bulb fraction and are assessed at the end of May, with the percentage of marketable bulbs, sprouted bulbs

and rotten bulbs recorded. The differences between the best and worst can be quite dramatic but is generally around 40% for ambient store material and 50% for CE store material. CE store material is more likely to be stored for longer so is expected to 'go over the cliff' faster when removed from store. While the sample does not directly equate to the varieties yield, by taking a simplified example of 60t/ha a 40% difference would equate to the equivalent of 24t/ha extra lost in the poorest performing varieties.

In reality stored crops are closely monitored. As such, growers will have a good knowledge of how long they expect to store their bulbs and when their material will reach a point where the losses are uneconomical.

Growers tend to select a range of varieties with characteristics that allow them to spread their harvest window; different specifications for different end uses, and to find a balance between high yielding varieties that only have a short storage potential and slightly lower yielding varieties which store for longer (often reflected in the price of the seed).

The brown varieties that have, in recent years, consistently performed well in ambient store are Vision, Wellington, Drytan, Motion and Hysky. In CE store Chico can be added to that list.

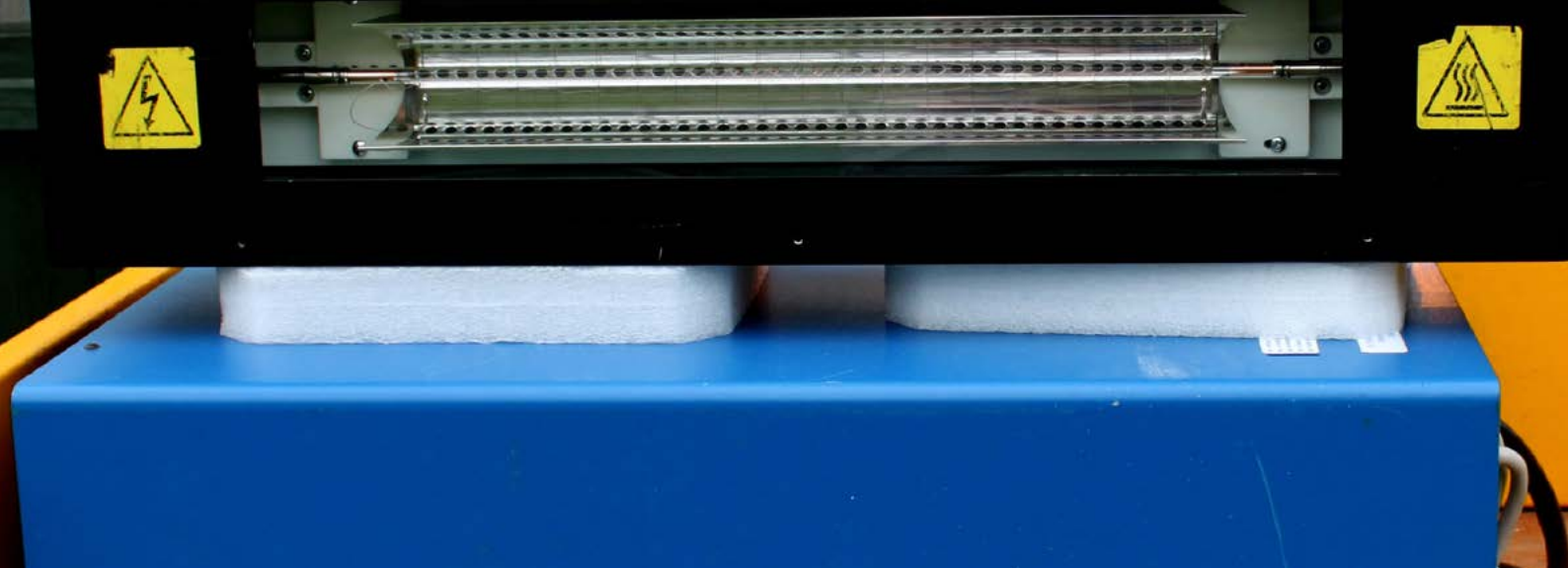
For the reds, Red Tide and Red Planet store reliably. In CE store, Redspark, Retano and Red Light also do well.

AHDB project code: FV 348d

Researcher:

Bruce Napier, NIAB

AHDB lead: Dawn Teverson



LIGHTS, CINEREA, ACTION

With an ever-decreasing range of conventional control options available, should growers be looking to UV-C hormesis to provide an alternative weapon in the battle against plant pathogens?

Since the introduction of EU legislation on the safe and sustainable use of plant protection products, horticulture has been left with a limited number of chemical control options. Furthermore, for tomato and lettuce crops there is not a single approved fungicide against *Botrytis cinerea* for which resistance has not been observed.

Fortunately for UK growers a new option is emerging to aid them in the fight against phytopathogens – UV-C hormesis. This is a phenomenon whereby the delivery of low doses of short wavelength UV light (UV-C) can bring about a positive effect in the plant receiving treatment. The UV-C acts as a stressor. Most of the research to date has focused on low-intensity UV-C (LIUV) sources, applied post-harvest to fresh produce, and has demonstrated positive outcomes. This method of treatment can offer benefits such as delayed chlorophyll degradation, increased nutritional content, and greater disease resistance.

However, despite the apparent positives and the low cost of equipment, commercial uptake has been non-existent among UK growers. This has been due primarily to the lengthy treatment times required to elicit hormesis and the need for full surface exposure in some types of produce.

AHDB-funded research, conducted primarily by Loughborough University PhD student George Scott, has focused on another possible solution – high-intensity pulsed polychromatic light (HIPPL) technology. The results achieved have been encouraging, and have confirmed that treatment times can be drastically reduced, thus offering the potential of a commercially viable form of treatment.

In tomato fruit, HIPPL was shown to induce resistance against *Botrytis cinerea* and *Penicillium expansum*, and delay ripening to levels similar to those observed for LIUV treatment.

By utilising HIPPL, treatment times were reduced by 97.3% compared to LIUV. This equates to a reduction from roughly six minutes to just 10 seconds per fruit.

Furthermore, while both treatments (HIPPL and LIUV) require direct tissue exposure, the study has revealed that although UV-C does play an important role in inducing disease resistance and delaying ripening, the mode by which the light energy is delivered using the HIPPL source – in intense short-duration pulses – was also a factor in achieving the outcomes observed. As, after filtering out the UV-C portion of the emission from the HIPPL source, 50% of the induced resistance and delayed ripening remained.

Of the results, Scott said, “LIUV and HIPPL treatments may hold the ability to protect plants against a broad range of pathogens, pests and abiotic stresses.”

The effects of HIPPL on lettuce grown in the glasshouse was also tested during the study, but results were highly variable and to date have not yielded conclusive outcomes.

Going forward, further research into pre- and post-harvest LIUV and HIPPL treatments as alternatives to chemical control will be necessary in order to provide much-needed control of pests and pathogens which can be incorporated into integrated pest management (IPM) strategies.

AHDB project code: PE 023

Researcher: George Scott,
Loughborough University

AHDB lead: Gracie Emery

“Despite the low cost of equipment, commercial uptake has been non-existent among UK growers”

What is UV-C hormesis?

The application of high doses of UV-C will result in death of the plant undergoing treatment. UV-C hormesis is a phenomenon whereby low, non-damaging UV-C doses bring about a positive response in the organism (ie the plant) undergoing treatment. Unlike traditional UV-C disinfection processes, disease control is achieved through activation of the plants' defence pathways and not from the direct inactivation of the pathogen.

EMERGING TALENT

The AHDB Crops Studentship Conference brings together the brightest minds from horticulture, potatoes and cereals to tackle today's growers' issues

Finding new and effective solutions to the crop protection problems that can destabilise an entire business has been the key driver for horticultural business longevity. For the industry to remain productive and competitive it relies heavily on new scientific breakthroughs to tackle established and new pressures.

The horticultural levy has been funding studentships since the beginning of the millennium, with more than 60 students having been through the scheme, ensuring AHDB has played the part to bring in technically trained and creative individuals.

Some of this emerging talent has been profiled in this edition of the Grower. For example, Bethan Shaw (CP 142) has been taking a timely look at the daily and seasonal behavioural rhythms of SWD in order to exploit its behaviour for future pest control (read more on page 10). On page 11 we also showcase project CP122, Nathan Medd's investigation into viruses suitable for SWD control that can work within an integrated pest management system.

Furthermore, over on page 29, George Scott's (PE 023) work has been looking into protective effects of short wavelength ultraviolet light to induce resistance against a range of pathogens on pre and post-harvest on tomato. Elsewhere, PhD student Aran Sena has been working on a cutting edge robotics project (HSN/PO 194) which seeks to investigate how a new generation of robots could be trained by growers to undertake routine plant-handling tasks.

These projects and many others will be profiled and discussed along with students from AHDB Potatoes and AHDB Cereals & Oilseeds at the second joint AHDB Crops Studentship Conference.

In addition to our main studentship programme, AHDB are keen to support student training through co-funded initiatives such as the recently awarded BBSRC Collaborative Training Partnership

for Fruit Crop Research (CTP-FCR). This pioneering partnership between businesses, research providers and the AHDB will provide an excellent horticultural and bioscience research-training programme for the UK fruit industry. The programme will address the scientific challenges faced by agri-businesses, from crop production, food quality and supply, through to consumer preference and consumer waste.

“The horticultural levy has been funding studentships since the beginning of the millennium”

ESTABLISHING A ROLE IN THE INDUSTRY

The expectation on AHDB students is to interact with the industry and growers and discover a career choice that fulfils their ambitions and drives forward the knowledge and skill in horticultural businesses.

Joe Martin, AHDB Crop Protection Senior Scientist, said, “We hope to hold onto the talent and fresh thinking and, through working closely with growers and businesses, they hopefully not only get a flavour of the innovation in the sector but also the great people that work within the sector.”

In July, AHDB took 16 students on an industry tour to visit some businesses focussed on horticulture, potatoes and cereals around Lincolnshire, providing the opportunity to share experiences and plans with other students and hear from a diverse range of growers about their experiences.

For more information about the studentship conference on 6 and 7 November, contact Joe on 024 7647 8629 or email joe.martin@ahdb.org.uk. To learn more about the studentship scheme, visit www.horticulture.ahdb.org.uk/studentship-scheme





SAFEGUARDING THE FUTURE

AHDB works hard to ensure the next generation of growers comes through. We speak to Rachel Warmington of the Eden Project about her studentship and what she learned along the way

Project overview:

Title: Pathogen diversity, epidemiology and control of Sclerotinia disease in vegetable crops

Aims: To identify potential new soil treatments for control of Sclerotinia disease and to assess pathogen diversity

Headline results: In trials biofumigant crops reduced germination of *S. sclerotiorum* sclerotia by up to 70%, but were less effective against larger Sclerotia

Further information: Visit horticulture.ahdb.org.uk and search for 'CP 080'

AHDB: Hi Rachel, tell us a bit about why you initially decided to embark on a studentship.

RW: I wanted to complete a PhD, and having completed a horticulture degree the studentship was an excellent opportunity to do this with close links to the horticulture industry.

AHDB: What was the most exciting moment you experienced during the project?

RW: Being awarded 'Highly Commended' in the Marsh Horticultural Science Award, and attending the John McLeod lecture to be presented with it.

AHDB: Were there any low moments you experienced and what did you learn from them?

RW: Having experiments running for long periods of time using untested methods meant that there were occasions when things didn't work out as intended and I had to go back to the drawing board to develop robust protocols. It can feel as

though you are throwing away several months of work, but ultimately it is all information which enables you to improve methods and procedures.

“It can feel as though you are throwing away several months of work”

AHDB: Thinking about your research, how do you think growers will benefit from it?

RW: I think it adds to the development of integrated pest management practices, something which is incredibly complex, but important for the future of horticulture.

AHDB: What is the next step for you and how do you think the studentship will help/has helped in achieving this?

RW: I have worked at the Eden Project since October 2014 as a plant pathologist. My work is very varied, in

a similar way to the variety of work I completed during my studentship. The contacts I made both within academia and horticulture as a result of my studentship have been extremely useful in my current role.

AHDB: Would you recommend a studentship to others?

RW: Yes I would recommend a studentship to others. I found it great for making contacts and having a connection with the horticulture industry. Additionally, completing the annual reports for the studentship forces you to write up your project results as you go along, this is very useful when you come to write your thesis.

Are you interested in a studentship or know someone who might be?
Find out more by visiting us at
horticulture.ahdb.org.uk/studentship-scheme

DATES FOR THE DIARY

Here is what is coming up in the next few months for growers and industry to get involved in:

OCTOBER:

HEALTHY HORTICULTURE CONFERENCE 2017

Fri 13–Sat 14 October 2017
horticulture.ahdb.org.uk/events
Crowne Plaza Hotel, Dublin

GREATSOILS WORKSHOP

Tues 17 October 2017
horticulture.ahdb.org.uk/events
Intercrop, Kent

SCEPTREPLUS PROTECTED EDIBLES OPEN DAY

Thu 19 October 2017
Stockbridge Technology Centre,
Yorkshire

NATIONAL FRUIT SHOW

Wed 25–Thurs 26 October 2017
nationalfruitshow.org.uk
Kent Event Centre, Maidstone, Kent

NOVEMBER:

THIRD INTERNATIONAL WORKSHOP ON APPLE CANKER AND REPLANT DISEASE

Wed 1–Fri 3 November 2017
niab.com
East Malling, Kent

GROWQUIP 2017

Wed 1–Thu 2 November 2017
cha-hort.com
Stratford Manor Hotel, Stratford-upon-Avon, Warwickshire

NIAB TAG ONION SEED OPEN DAY

Thu 2 November 2017
niab.com
NIAB Park Farm, Histon, Cambridgeshire

GREATSOILS: VARIABLE RATE NITROGEN APPLICATION ON BRASSICAS

Tues 7 November 2017
horticulture.ahdb.org.uk/events
Yorkshire

SAVING WASTE IN HORTICULTURE: OPTIMISING RESOURCES

Friday 10 Nov 2017
niab.com
NIAB Park Farm, Histon, Cambridgeshire

BIENNIAL UK ONION AND CARROT CONFERENCE

14 November 2014
East Midlands Conference Centre,
Nottingham

AHDB/ EMR ASSOCIATION SOFT FRUIT DAY

Tues 21 November 2017
horticulture.ahdb.org.uk/events
The Orchards, East Malling, Kent

PEA VINING AND BEAN CONFERENCE

Tues 21 November 2017
ukpeaandbeans.co.uk
Kingsgate Conference Centre,
Peterborough

This publication is brought to you by AHDB

For more information contact:

AHDB Horticulture
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL
T: 024 7669 2051
E: comms@ahdb.org.uk
W: horticulture.ahdb.org.uk
T @AHDB_hort



© Agriculture and Horticulture Development Board 2017.

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

AHDB Horticulture is part of the Agriculture and Horticulture Development Board (AHDB).

All rights reserved.

AHDB PUBLICATIONS PORTAL

CAN'T FIND WHAT YOU'RE LOOKING FOR?

Visit the AHDB Horticulture portal to easily search and find all the latest factsheets, guides, posters and magazines in electronic format, perfect to view on your phone or tablet while out and about.

To access the portal login into the horticulture website first and then visit: horticulture.ahdb.org.uk/publications-portal

You can download to print straight away or place an order for a professional hard copy.