WINTER 2020

THE GROWER

THE TECHNICAL JOURNAL FOR HORTICULTURE

Cost-effective solutions for weed control in containers

Focusing on the future

How horticulture students are shaping the industry

REFLECTION ON THE CALL FOR A BALLOT

by Hayley Campbell-Gibbons, Chair of the AHDB Horticulture Board


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ACKNOWLEDGEMENTS

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COMMENT

Hayley Campbell-Gibbons
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All of our lives and businesses have been dominated by the impact of coronavirus this year. AHDB's contribution to supporting growers has included launching the Pick for Britain seasonal labour hub and providing guidance on practical measures such as social distancing, as well as offering payment relief to growers experiencing financial hardship.

At the same time, the AHDB Board and management team worked alongside our new Chair to finalise our response to the Request for Views and agree a new five-year strategy.

Our new commitment to levy payers includes holding a regular ballot on the future of the organisation, as well as a formal review of our governance – vital for achieving a more cohesive, lean and focused body and improving representation and engagement.

In the Horticulture sector, the Request for Views feedback reflected particular frustrations growers have with the organisation, especially around the levy calculation. It reiterated the sector's continued focus on the critically important, pre-competitive research and science we deliver to growers. And, although the majority of growers supported the continuation of the levy, the feedback gave a clear signal of the need for us to do more, and to improve how we work with growers – our customers – at all levels.

Since then, a ballot in Horticulture has been confirmed. Find out more at **ahdb.org.uk/what-do-i-get-for-my-levy-horticulture**

I want to thank the growers and their representatives who continue to take the time to give us feedback. It's all incredibly valuable. We will be holding a series of town hall open meetings where I will be setting out how, in the coming weeks and months, growers can expect us to operate in future. We are committed to doing better in all of the areas you highlighted, with a focus on reducing costs, improving access, delivery and engagement with you. We are open and receptive to change.

AHDB is your levy body and delivering meaningful impacts for growers must be at the root of everything we do.

CONTENTS

Meet the team

Hayley Campbell-Gibbons

AHDB Board and Horticulture Sector Chair

My name is Hayley Campbell-Gibbons and I am the AHDB Board and Horticulture Sector Chair. I am proud to introduce you to the Horticulture Knowledge Exchange team who are here to answer any questions that you may have.

Ruth Ashfield

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Ruth is the Strategy Director for AHDB Horticulture and is your contact for any wider enquiries for the ballot and your levy.

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Ornamentals Knowledge Exchange Manager

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NEWS & **UPDATES**

IN **BRIEF**

New poinsettia graphical tracking tool

Did you miss our new poinsettia tracking tool? Free for all to use, it has been developed to help support the daily cultural decisions taken by growers. Visit **ahdb.org.uk/news/poinsettia-tracker** for more information.

New look for your ToBRFV hub

It's easier than ever to find the latest news and advice for controlling tomato brown rugose fruit virus. Visit **ahdb.org.uk/knowledge-library** to find out more about the symptoms, spread and outbreaks of this damaging virus.

Chlorate and perchlorate MRLs are now in force

Maximum residue levels (MRLs) of chlorate permitted in fruit and vegetables are now legal limits in the UK for all traded edible fresh produce. Growers should assess the risk factors that may lead to the maximum level being exceeded and act to address risks, while ensuring produce is microbiologically safe to eat. The legal MRLs for different produce can be found online on the EU Pesticides Database.

Perchlorate MRLs are now also in force.

LIAISON – Long Term Arrangements for Extension of Use database

The secure login from the Long Term Arrangements for Extension of Use (LTAEU) version of LIAISON has been removed, and growers can now directly access the database to interrogate the current approval status of a wide range of plant protection products. The site not only highlights products with both label and off-label (EAMU) approval, it also lists those that can still be used under the LTAEU, useful to growers of ornamentals, nursery fruit crops and hops. Visit the new site at **https://secure.fera.defra.gov.uk/ltaeu**

EVENTS ALERT

Don't miss out on the latest news and updates from industry experts and our network of researchers. Our regular horticulture webinar series takes place very fourth Thursday of the month at 6:30pm.

Visit **ahdb.org.uk/events** and **ahdb.org.uk/podcast** to watch and listen to the latest in horticulture.

IPM IN HORTICULTURE MONTH

We'll be bringing you the latest news and results from our integrated pest management (IPM) programmes in a month-long series of webinars running from 19 January. Drawing on conclusions from both our SCEPTREplus and AMBER trials, as well as wider research, this will be an opportunity to hear directly from our researchers about the latest developments in pest management in horticulture. Industry representatives will also be taking part to update on practical application.

Covering all sectors within horticulture and with plenty of opportunity to ask your questions, this will prove a fantastic opportunity to prepare for the year ahead. To register, visit **ahdb.org.uk/events**

NEW BRASSICAS FARM EXCELLENCE CENTRE

Our Farm Excellence programme has been extended as East of Scotland Growers (ESG) has joined us as the new Strategic Centre for field vegetables – Scotland. A series of four grower-led trials will be conducted over the brassica-growing season, focusing on the prevention of downy mildew in cauliflower and the impact of biostimulants on crop health and vigour. They will also be drawing upon the work of AHDB's SCEPTREplus trials, looking at herbicide screening pre- and post-planting.

AHDB strategic centres for field vegetables conduct 'core' variety evaluation trials each year. More information about all our strategic centres can be found at **ahdb.org.uk/farm-excellence**

Horticulture levy payers receive **BALLOT ANNOUNCEMENT LETTER**

Horticulture levy payers have received the first letter from AHDB about the upcoming ballot.

The letter, signed by AHDB Chair Nicholas Saphir, is aimed at business owners of horticulture levy-paying businesses and asks for confirmation from each business of which individual will cast the vote in the ballot.

The reason for the request of a named contact is down to parliamentary legislation. By law, any business that pays horticulture levy is entitled to one vote to answer a yes/no question on the continuation of an AHDB levy in the horticulture sector. For businesses that are partnerships, it means that only one person can vote and so a named contact must be given to ensure that the ballot papers go to the correct individual.

The letter also goes on to announce a series of virtual town hall open meetings, with the first scheduled for Monday 14 December at 1:30pm – 2:30pm.

Want to know more of the detail behind the ballot and register for these events?
Go to **ahdb.org.uk/what-do-i-get-for-my-levy-horticulture**

NOW OPEN

Register for our online open '**town hall**' events where you'll have the chance to meet our Chair, Nicholas Saphir, AHDB Board and Horticulture Sector Chair, Hayley Campbell-Gibbons, and other members of the horticulture team.

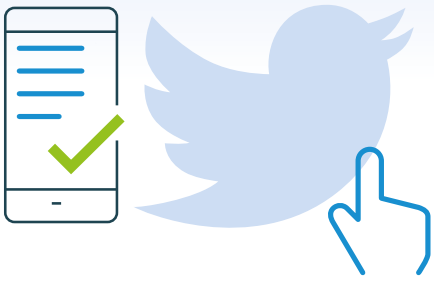
Ask the questions you want answered ahead of the ballot on your levy. We want you to come and have your say, plus give us feedback on the **new five-year strategy** and what that means for the future of horticulture at AHDB.

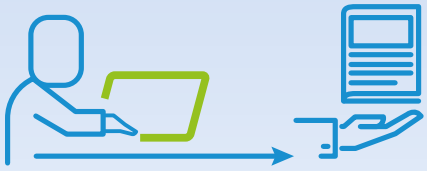
Sign up at: ahdb.org.uk/horticulture-town-hall

Want to find out more about **your sector** and what **you** get for your levy?

Visit ahdb.org.uk/what-do-i-get-for-my-levy-horticulture

Be the first to find out when **EAMUs** are approved. Follow us on **Twitter** to get real-time updates on EAMUs, news and research **@AHDB_Hort**





Know someone who would like The Grower?

They can sign up for this **free** technical journal with **three issues a year** to find out more about sector-led research.

Visit **ahdb.org.uk/keeping-in-touch** to sign up to this and much more!

HORTICULTURE

For more information visit:
ahdb.org.uk/what-do-i-get-for-my-levy-horticulture

Chair calls … In January, **CAST YOUR VOTE**

Hayley Campbell-Gibbons, AHDB Board and Horticulture Sector Chair, recently spoke with Jennifer Morgan, Senior Marcomms Manager (Horticulture), about the upcoming ballot in AHDB Horticulture.

Hayley, you've been Chair of the AHDB Horticulture Board for two years now and have met with many growers and industry bodies to get a detailed picture of the perception of AHDB and the services it provides. Does the call for a ballot come as a surprise to you?

"Growers are within their rights to call a ballot. That said, it's a huge disappointment to me, and the dedicated team of AHDB colleagues who work so passionately for the horticulture sector, that some levy payers don't see a value in the work we do.

"Yes, there are justifiable issues growers have with AHDB, and clear improvements we can and will make.

> "At a time when the industry faces such unprecedented challenges and changes, I'd argue that our work on crop protection, emergency chemical approvals and driving labour efficiency, is more important than ever"

Some have argued in the press that AHDB solely decides how growers' levies are spent. Do you feel that this is a fair representation of the decision-making process behind how the levy is spent?

"All of the levy spend in horticulture is grower-led and focused on finding solutions to practical challenges. We have panels representing crop groups which are made up of growers, agronomists and technical managers from horticultural businesses. Essentially, it's those that are on the ground who say what the current issues and priorities should be, and therefore, where levy should be spent."

So that we can understand what that means, can you give us some tangible examples of what that looks like?

"Of course. Grower-led spending focuses on the urgent needs of the grower, such as EAMUs (Extension of Authorisation for Minor Use) to access insecticides, herbicides, fungicides and so on.

"70% of all EAMUs are secured by AHDB, and nobody else has the level of credibility and access we do to the chemical companies and CRD (Chemicals Regulation Division – part of the Health and Safety Executive).

Continued overleaf

"Growers are also concerned with new and emerging pests and diseases and have directly inputted into allocating funding for these areas, such as:

- Over £30 million invested over 5 years in research projects spanning everything from Tomato Brown Rugose Fruit Virus and Spotted Wing Drosophilia to new breeding programmes for apples, pears, strawberries and raspberries
- Fast-tracking new products into the crop protection toolkit – investing £1.7 million over four years to assess a range of bioprotectants and botanicals alongside conventional pesticides"

What feedback have you had from growers on the value of the levy?

"When speaking to growers, my impression is that, despite annoyances with the organisation, most don't want to imagine a future without AHDB. This was reinforced by Defra's Request for Views, where 68% of horticulture respondents wanted to retain a statutory levy. That said, it is time for change at AHDB, and we are committed to reform in several key areas."

> "The call for reform that some growers and grower associations have raised is obviously about more than the focus on the levy mechanism and whether growers are involved in the decision-making process of spending the levy, it's about transparency of that spend"

But what does that mean for the levy? You mentioned in your 'Four Future Area of Focus' podcast, that the levy calculation is something that is being looked at.

"The levy is a long-standing area of concern. In a competitive and highly consolidated sector, a rate of 0.45% of turnover represents a big bill to some growers and a significant proportion of business profit. We are actively exploring alternative methods for certain crops, and revising the calculation to take account of businesses with integrated packing and processing operations. Our aim is to ensure that the levy rate is fair, proportionate and is also flexible enough to reflect the varying needs of crop sectors."

The call for reform that some growers and grower associations have raised is obviously about more than the focus on the levy mechanism and whether growers are involved in the decision-making process of spending the levy, it's about transparency of that spend.

"Seeing more detail on where the money goes, particularly AHDB's costs, is also something growers consistently raise. Growers can expect to see costs come down, and greater transparency and clarity on where the levy is being spent.

"AHDB is doing a lot for horticulture, but we aren't communicating the outcomes and benefits clearly enough to growers. We need to think in terms of customer service, account management and move away from a 'one size fits all' approach to our communications.

"If there can be a positive legacy from this pandemic, it's making use of digital tools to communicate more rapidly and regularly."

Continued on next page

"Gone are the days when a grower would have to travel to Stoneleigh to have a say on how their levy is invested, when it can be done in an hour from your farm office. Face-to-face contact will always be king, but there's a lot more interface to be had online in future too."

In your conversations with growers, grower associations and wider industry, what are the clear concerns and issues that are currently being discussed?

"It's been an incredibly hard year for growers who have been affected by the pandemic, with significant obstacles in access to labour, closure of garden retail, flooding earlier in the season, and so on. Now, with another lockdown and Brexit rapidly coming on the horizon, the ballot could instigate another area of significant change to the horticultural industry, with a 'no' vote meaning that AHDB stops supporting the industry at this crucial time."

If you have one thing that you would like people to think about with the upcoming ballot, what would that be?

"I would ask all growers to carefully consider the reform and strategy package that we will be publishing in December and I would hope that it will give them sufficient confidence that we have taken on board all of their criticisms and are embarking on a process of fundamental change."

> "Above all, the most important thing growers need to do in January is vote"

Now that the ballot has been triggered, where are we?

1. Verification of submitted forms ✓
2. Ballot confirmed ✓
3. Procurement of independent company – to ensure robust process and integrity of results ✓
4. Ballot updates including the ballot process to follow (**ONGOING**)
5. AHDB Reform and strategy document published in December for feedback
6. Voting period opens in January
7. Results confirmed and sent to Defra Under Secretary of State, Victoria Prentis

Our five commitments to you

1. We will seek your views on a new strategy and communicate regularly on how your levy has been spent and the benefits
2. We will hold a regular ballot on the future of the levy
3. We are working with growers and the supply chain to design a modern levy system
4. We will focus on farm performance and market development at home and overseas, driven by independent evidence
5. We are currently reviewing our board and committee set-up, with recommendations due by the end of the year

FOCUSING ON THE FUTURE

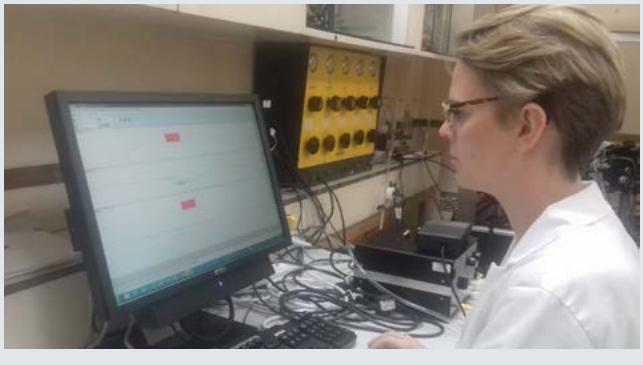
Three years into the programme, Robert Saville, AHDB Crop Protection Scientist, asked two of the students involved in the Collaborative Training Partnership for the Fruit Crop Research programme to reflect on their research.

The Collaborative Training Partnership for Fruit Crop Research (CTP-FCR) began in 2017 and supports PhD studentships for UK horticulture. Led by Berry Gardens Growers Ltd. it is jointly funded by AHDB, the Biotechnology and Biological Sciences Research Council (BBSRC) and a consortium of businesses with interests in soft, stone and pome fruit. Together with NIAB EMR, the programme also brings onboard six universities with the expertise and capabilities to tackle strategically important research and development areas including crop protection, robotics and artificial intelligence (AI), genetics and plant physiology. Industry engagement also ensures that the research is strategic and relevant. Each student also completes an industry placement, further promoting industry interaction, and helping to build and retain technical and research capacity in the industry. Through this programme, the next generation of researchers will be trained to support the horticultural industry in the UK. Here we meet two students currently in their third year.

CHRISTINA CONROY

Spotted-Wing Drosophila (SWD) causes significant damage to soft and stone fruit growers each year and the control of this pest has formed the basis of Christina's research. With both a summer and winter form of this pest, and control methods limited to good hygiene and spray products, Christina has been developing a new year-round push-pull control strategy. Her research is the first to find behavioural differences between the summer and winter morphs and is identifying repellents that are effective within the crop.

"The horticultural industry allows me to solve real-world problems while contributing to my chosen field. I was attracted to this PhD as it offered me a 3-month placement, allowing me to develop my industry knowledge. I have also had the opportunity to organise and chair a symposium, take on placement students, attend a wide range of conferences, and was president of the Natural Resources Institute Postgraduate Society.



"In the short term, my research will help growers be aware of the differences in summer and winter morph behaviour, and plan accordingly. In the long term, this could aid in the creation of a push-pull control strategy. The repellent identified in this research will 'push' SWD from the crop and commercially available attractants 'pull' it into a trap.

"I undertook my placement at Berry Gardens. I chose to work in four departments where, previously, I had little or no exposure. It was humbling to see the connectivity between teams, and the respect and time given to me as a work placement student. Several department heads took time to discuss my research and aid me in identifying transferable skills I would need to be a success within the industry.

"Interacting with growers and industry leaders has shown me the impact that research can have on the grower community, and the importance of picking a career path that you are passionate about. To me, the horticulture industry offers multiple exciting opportunities and I look forward to working within it."

RAYMOND KIRK

Raymond's PhD is the technology of the future. His research aims to bring human intuition and apply it to camera systems, with benefits ranging from guiding mechanical harvesters to improving crop management, and smarter labour strategies. This will allow growers to detect, classify maturity and weigh non-destructively at a large scale, while also tracking individual berries through the season with the use of GPS, and producing counts for yield forecasting as harvest approaches.

"Prior to my PhD, I worked with medical imaging systems (specifically echocardiograms) and conversational agents so the transition to horticulture was a big shift! I had started work on an automated soil sampling project before starting my PhD, which set me on a path to see how I could apply my robotics and computer vision expertise in horticulture (besides, who doesn't love strawberries?).

> "During one of my placements on this programme, I developed a deeper appreciation for other research areas in agriculture and I experienced first-hand how the problem-solving approach taken in horticulture can be applied to more than just soft-fruits"

"At Garford Farms Machinery, we looked at using camera-enabled weed detectors to guide and smartly clear crop profiles of weeds without ever damaging the crops.

"Ultimately, my research will contribute to significantly reduced labour costs, with the advent of harvesters. Labour efficiency will also be bolstered with smarter deployment in field, a result of large-scale analysis of current crop performance. Finally, yield estimates will be more accurate and reflective of inner-row variances and crop profiles."

To find out more contact your AHDB Knowledge Exchange Manager:

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Improving quality and shelf life of poinsettia through non-chemical growth control

As the number of available plant growth regulators (PGRs) diminishes and restrictions are placed on their use, Mark Else explores the alternative options available to growers.

The challenge

As a result of the loss of several PGR products containing chlormequat, and restrictions on the rate and number of applications of the remaining product (Stabilan 750), AHDB commissioned work to explore the potential of using regulated deficit irrigation (RDI) to control stem height in poinsettias. This technique involves imposing a mild substrate drying treatment at specific stages of plant development to trigger root-sourced plant hormones that restrict stem elongation and limit water loss from the leaves.

Previous work

In Defra-funded work carried out by NIAB EMR and Staplehurst Nurseries Ltd between 2004 and 2008, we showed that RDI applied during the period of rapid stem extension effectively limited plant height so that retailer specifications were met at market date, despite a 90% reduction in PGR use. Compared with well-watered control plants that received the commercial PGR programme, RDI-treated plants were more tolerant of chilling stress, while bract and leaf drop during shelf-life tests were reduced by 90% and 50%, respectively.

Armed with this knowledge, Neame Lea Ltd. used a 'dry growing' regime in combination with other strategies to achieve plant height control without reliance on PGRs in their 2016 commercial poinsettia crop. Further work funded by AHDB (PO 21a/b 'New poinsettia genetics and controlled substrate moisture growing') used technologies developed for the soft fruit sector to fine-tune the RDI approach for poinsettia crops, and successful trials were again carried out at Neame Lea in 2017 and in 2018 on large plant numbers. The quality of RDI-treated plants at dispatch, and during and after shelf life was at least as good as commercial counterparts.

Scaling-up using digital technologies

These previous successes were achieved with ebb-and-flow bench systems, and some growers are unsure whether these benefits could be transferred to their nurseries. To help address these concerns, and to quantify the potential of using RDI as a non-chemical means of growth control more widely on bedding and pot plant crops, AHDB funded PO 22 ('Developing precision and deficit irrigation techniques to reduce reliance on PGRs and to optimise plant quality, uniformity and shelf life potential in commercial protected pot and bedding plant production'), which builds on the success of our previous work and focuses on delivering impact for the industry.

We are developing data-driven technologies and approaches to enable the RDI work to be scaled-up. This will allow us to deliver non-chemical growth control across the nursery in a range of production systems currently used by small-, medium- and large-scale protected bedding and pot plant growers.

In 2019, we successfully imposed an RDI treatment to a commercial poinsettia crop at Staplehurst Nurseries, which was managed remotely by the NIAB EMR team using real-time telemetry data from multiple sensors monitoring the root and the aerial environments.

Plant height specifications were achieved in RDI-treated plants with just a single spray of PGR applied after pinching. Overall plant quality was scored using newly developed quality criteria and was as good as the commercial control plants at dispatch (see Figure 1), and leaf and bract drop during shelf life were significantly reduced, leading to improved overall quality well into January (see Figure 2). We expect that this data will help to boost grower confidence in the RDI approach, and drive commercial uptake of an RDI scheduling service.

In 2020–21, we are developing and extending the RDI approach for use on pack-grown bedding plants and this will require a different set of technologies. We will use weather probability forecasting, wireless weighing platforms and environmental sensors to calculate current and future plant water demand so that a controlled substrate drying regime can be applied safely to bedding plants grown in packs of different sizes. In addition to achieving good height control, we hope to be able to improve quality and resilience to the stresses and strains encountered during dispatch and retailing, as we have with poinsettia.

Much of the RDI work to date has been carried out using ebb-and-flow bench systems. Grower members of the PO 22 consortium also grow on capillary matting and on floor ebb-and-flow systems and so we are also investigating how to improve the uniformity of irrigation and to deliver benefits of RDI in these growing systems.

To find out more about project PO 21a/b or PO 22 contact your AHDB Knowledge Exchange Manager:

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Figure 1. Commercial control plants

Figure 2. Leaf and bract drop during shelf-life were significantly reduced

ACTION POINTS FOR GROWERS

- Ensure benches are level using a laser, or just plain water
- Improve irrigation system performance by using pressure-regulated irrigation inputs
- Clean bench trays, channels and drainage holes regularly, to improve the uniformity of irrigation water distribution
- Measure, map and monitor the various phytoclimates (naturally occurring microclimates) in your growing area, and note their effects on plant uniformityand quality – don't just ignore variability
- Consider using real-time data collected in zonal phytoclimates to inform your decision-making
- Encourage a good strong root system to optimise the uptake of water and fertiliser, and to build resilience during hot weather

Nutritient delivery in **BEDDING AND POT PLANTS**

AHDB Resource Management Scientist, Georgina Key, explains that irrigation system, substrate type and pH affect nutrient delivery in pot and bedding plants.

Georgina Key
Resource Management Scientist

Optimising nutrient delivery

A questionnaire put to growers revealed several areas in which nutrient management recommendations were either lacking, or out of date for pot and bedding plants. As a result, Hilary Papworth and her team at NIAB ran trials in 2019 to investigate the impact of irrigation system and substrate type on nutrient delivery.

Pansy trial set-up

In spring, Petunia F1 'Frenzy Blue Vein' plants were grown in 13 cm pots. The three irrigation methods examined were overhead, ebb and flood, and capillary matting with trickle tape. The substrates were a 70:30 peat and perlite mix, a 70:30 peat and wood fibre mix, and a 70:30 peat and coir mix. In the autumn, Pansy 'Matrix Blue Blotch' plants were grown in plastic 12 cell bedding packs, using the same irrigation and substrate types as the summer petunia trial. All received the same liquid feed regime throughout the trials.

The findings confirmed established principles applied for these products, including:

- The right liquid feed and feeding intervals can reduce the impact of nutrient leaching and pH increase in growing media caused by overhead watering
- Capillary matting used the most water and also resulted in a build-up of 'salts', leading to high electrical conductivity and poor growth in the pansies. This can happen during periods of low transpiration. The petunias were still of an acceptable quality
- Ebb and flood used less water than capillary matting, while unusually, in this trial, overhead irrigation used the least amount of water. Plants from the ebb and flood, and overhead systems performed as well as each other
- Plants grown in peat and wood fibre substrate showed early symptoms of phosphorus deficiency. Additional phosphorus for early stage growth seems to be important when using wood fibre mixes

> While these results add to our knowledge, this information should be backed up by general good practice

Primrose leaf edge scorch

While not specifically investigating the causes of primrose leaf scorch, NIAB focused on developing good nutrition and environmental recommendations, which helped avoid it. Primula plants were grown under lower and higher humidity conditions in growing media with a range of pH, to try to force the appearance of leaf necrosis.

Calcium and boron deficiency can cause leaf necrosis. High humidity means less water is lost from leaves to the air, so less water (and therefore calcium and boron) is taken up by the roots. This can result in a deficiency. Growing media pH also affects how available calcium and boron are to the plant.

Rapidly growing leaf tissue is most likely to develop dead, brown edges, but where growth is slower, symptoms do not appear even if key nutrients are at low levels in the tissue. It is possible to improve calcium nutrition by avoiding high humidity conditions, and avoiding low pH growing media. This is also true of boron, but the link with pH is more complex. The trial showed that a reduction in humidity of 10% was enough to improve calcium and boron content in the leaf tissue.

Other nutritional work

This work is part of a larger four-year project on nutrient management across protected ornamentals, bulbs and outdoor flowers, which has input from both Omex and ICL Fertilisers. In 2020, NIAB started investigating nitrogen application to field-grown narcissus, and the effect on stem length and basal rot. NIAB will also look into Nitrate Vulnerable Zone restrictions, and whether winter fertiliser applications are key to crop and bulb quality. Two sites – one in Cornwall and one in Lincolnshire – have been secured, and soil analysis for both sites has been provided by the growers to inform the trials.

NIAB will also be looking at how to hold and then kick-start plug plants – Volmary and Kernock Plants will be involved in these trials. Throughout the trials for this project, NIAB will use smart phones and cameras to capture time-lapse photography, to develop photographic references that growers can use to spot nutrient deficiencies.

There will be more updates as the project progresses!

To find out more about project PO BOF 003 contact your AHDB Knowledge Exchange Manager:

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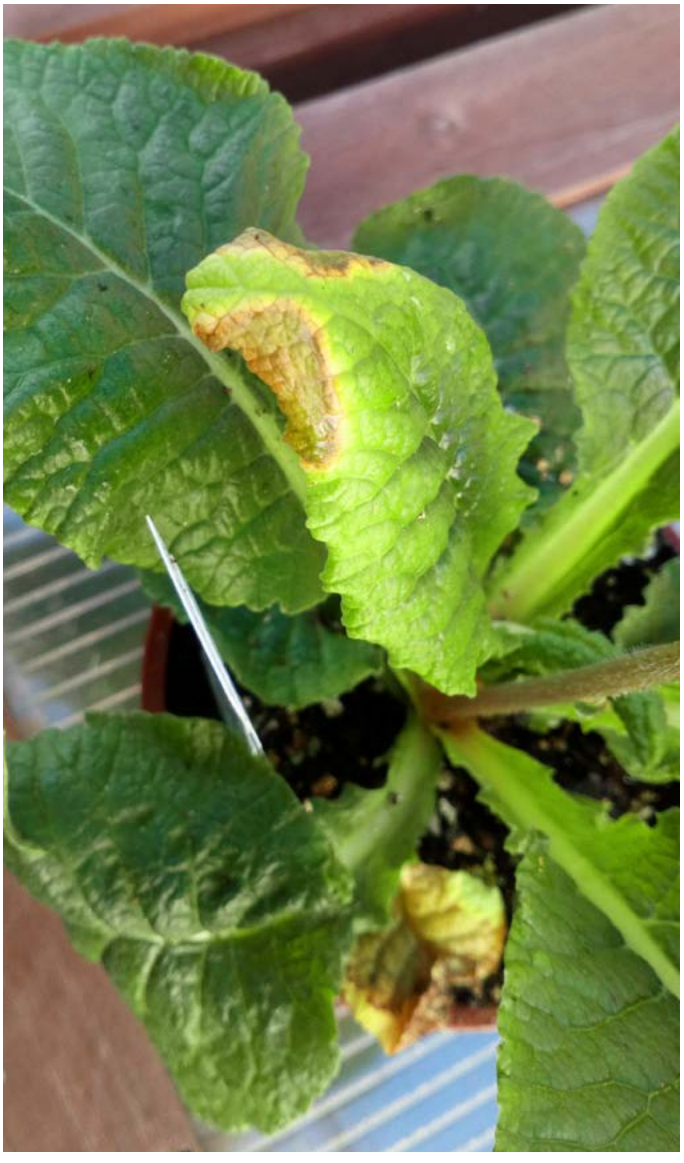

Primrose leaf edge scorch

Phosphorus deficiency

EAMUs in focus

AHDB's Crop Protection Senior Scientist for Pesticide Regulation, Joe Martin, updates us on his team's work to ensure we are all up to date with the latest EAMUs.

Maintaining contact with growers during the COVID-19 crisis has been challenging. However, we have all embraced modern forms of communication, to function, and even thrive, during this crisis. The AHDB EAMU team has risen to the occasion and has continued to bring the latest crop protection information to growers.

Lockdown hit at a critical stage of evaluation for our 2020 emergency authorisation applications, when communication with the Chemicals Regulation Division (CRD) was most crucial. CRD staff managed to continue working closely with us despite IT difficulties and limited access to phones. In the face of increasing pressure from the Expert Committee on Pesticides to reduce the number of emergency applications, the majority were able to address our most dire crop protection needs. Putting together these applications is very time-consuming and costly and, as such, we hope to reduce the number required during 2021 by forward planning and working closely with the industry.

During this time, we have been developing new ways to inform growers of the latest EAMUs and emergency authorisations. Our team coordinator has been diligently updating our EAMU webpage (**ahdb.org.uk/latest-eamus**) with the latest new authorisations obtained by the team. Each update is organised by crop sector to help you quickly find the most appropriate information. If you want to get in contact with views, suggestion or comments on any regulatory issues or EAMUs, we now have a central point of contact for growers and agronomists – **EAMU@ahdb.org.uk** This email address is monitored daily and queries are answered by your crop sector representative in the EAMU team.

The Crop Protection Team is also embracing new forms of communication by using the AHDB Hort Twitter account, to provide the latest emergency authorisation alerts. Twitter is a great way of alerting you to new EAMUs and emergencies as soon as AHDB receives them, so be sure to follow us for the latest crop protection news @AHDB_Hort. Latest authorisations will be tweeted when they are uploaded to the website. Be the first to be informed of new emergencies by setting up Twitter alerts so you will be notified as soon as these are uploaded!

The monthly Crop Protection News newsletter summarises all the authorisations gained over the past month, highlights any products likely to be withdrawn in future, and other crop protection and industry news.

If you would like to receive the newsletter, have any ideas, comments, concerns or any other queries, please contact **EAMU@ahdb.org.uk**

MANIPULATING **EVOLUTION**

Survival of the fittest by natural selection means a population will adapt to its given environment over time, says James Taylor, AHDB's Technical Graduate – crops. Experimental evolution exploits natural selection and is leading to the development of enhanced biocontrols for use in horticulture.

During experimental evolution trials, the environment of a population can be manipulated to increase the chances of certain traits evolving. By manipulating the environment of biological control agents (biocontrols), we can enhance their ability to control pests.

As part of the research to improve biocontrols, experiments are underway to evolve bacteria and fungi to become more effective in controlling aphids.

Enhancing biocontrols

Aphids thrive in glasshouse systems and, due to both the range of host plants and the rapid reproductive cycle, they are particularly hard to eradicate once they have become established. Chemical insecticide solutions risk increasing the chance of resistance developing, while also harming the beneficial insects now routinely used in glasshouse production.

Previously, work has investigated the potential for naturally occurring bacteria on plants to act as biocontrol agents, particularly against aphids and thrips. The three most effective bacteria identified were *Pseudomonas fluorescens*, *Citrobacter werkmanii* and *Pseudomonas poae* (*P. poae*). Currently these three substances have not been approved for use in Europe.

Subsequent investigations found that *P. poae* had the highest success at killing aphids. Appearing to deter aphids from the crop, it resulted in significantly reduced aphid populations, while having no negative effects on the plant. *P. poae* had no noticeable effect on non-target insects, such as species of Lepidoptera and ground beetles.

Evolving bacteria

P. poae was originally identified on the roots of Brassica oleracea and found to be pathogenic to green peach-potato aphid, lettuce aphid, glasshouse potato aphid, cabbage aphid, lupin aphid and pea aphid. It is most effective as a foliar spray or soil drench.

Experimental evolutionary methods were used to make the bacteria more efficient as a biocontrol. Key traits in the bacteria for the control of aphids were identified, allowing researchers to artificially evolve and improve the bacteria over several weeks.

Within 42 hours, 70% of aphids were killed by *P. poae*. By applying evolutionary selection experiments, it is hoped this can be improved, increasing overall death rate and reducing the time it takes for the bacteria to be effective.

The ability of *P. poae* to form biofilms is also being investigated. Biofilms are clusters of bacteria that can stick to surfaces and form communities. This helps bacteria to survive longer on the plant, making it more effective. *P. poae* formed successful biofilms, but this had a negative impact on its ability to kill aphids and survive on the crop.

Advancing fungi

Ongoing research is assessing whether the aphid clones that display resistance to chemical aphicides are susceptible to fungal infection. Novel selection techniques will be used to develop more harmful strains of the pathogenic fungi, so growers can improve the control achieved in the field. Ultimately, the aim is to produce clones of pathogenic fungi that have increased killing power in multi-resistant clones of aphids.

The potential value of experimental evolution has long been recognised. As its use continues to expand, our ongoing research will enhance biocontrols, making them a more effective asset in integrated pest management programmes.

To find out more about project CP 120, contact your AHDB Knowledge Exchange Manager:

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PROGRESSING PLANT PROTECTION

As our SCEPTREplus programme enters its final stage, Joe Martin reflects on particular successes and ongoing developments.

Joe Martin
Crop Protection Senior Scientist

Established in 2017, the SCEPTREplus programme has been researching sustainable plant protection products for use throughout the horticulture industry. Focusing on high priority diseases, pests and weeds (targets), SCEPTREplus embraces the control element of the *Prevent*, *Detect*, *Control* mantra of our IPM programme and has sought solutions where there are gaps in available control options.

SCEPTREplus has helped speed up the process of bringing products to market and protect the industry against supply chain vulnerability by increasing the number of product options available to growers. Over the past four years, 25 targets, affecting fresh produce and ornamental crops, have formed part of these trials. Chemical and biological crop protection methods have been explored, seeking an integrated pest management approach. Reports from the individual trials can be found at **ahdb.org.uk/sceptreplus**

Finding new options for aphid control has been important across all edible and ornamental sectors. Trials were conducted on a variety of different crop types, recognising that the level of control varied depending on the product and aphid species. As a result of this, several useful products, both conventional- and bioprotectant- (a new term for biopesticides) based, have been identified. These are now being progressed by the regulatory team at AHDB for EAMUs, in conjunction with the product manufacturers and Chemicals Regulation Directorate (CRD). Among others, this has included an early EAMU for the use of Flipper, which was shown to offer good aphid control over several different species.

By the end of 2019, 70 potential products had been identified with useful efficacy against 13 targets, including aphids, spotted wing drosophila, two-spotted spider mite, capsids and onion thrips among others. This has included both conventional and bioprotectant approaches.

In some cases, products tested have proved to have insufficient levels of control or there has simply been a lack of available products to include in trials. The use of an integrated pest management system is more important than ever, especially for the control of

SCEPTREPLUS

pests that are difficult to target where contact action is required by a product.

This was particularly true with the control of bean seed fly. In trials, none of the in-furrow treatments were effective in reducing the damage to peas caused by bean seed fly larvae, when compared with the insecticide free control.
A PhD studentship was commissioned as a result of this, with funding from AHDB, PGRO and Warwick University, to develop an integrated strategy for bean seed fly control. It is anticipated that this PhD will allow us to fill the gaps in current knowledge about the biology of this pest, which will underpin the future strategy for its control.

Across the industry we are continuing to lose conventional chemical control options. It is important that future control methods for pests, weeds and diseases fit into the integrated pest management approach. The increase in number of available bioprotectants does provide opportunities for growers, and SCEPTREplus has shown that they are effective and can fit well into your control programme.

Work continues on a number of pest priorities, although some trials have been delayed due to COVID-19. You can keep up to date on our latest crop-specific findings or read our latest trial blogs online at **ahdb.org.uk/sceptreplus**

Key conclusions from our trials will also be presented in our IPM in horticulture webinar series running from 19 January 2021.

To find out more about the SCEPTREplus programme, contact your AHDB Knowledge Exchange Manager:

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Optimising spray application in raspberry

Charles Whitfield, Crop Protection Engineer at NIAB EMR, outlines the results of a trial to optimise spray application in raspberry.

Charles Whitfield
Crop Protection Engineer
at NIAB EMR

Raspberry crops can be difficult to spray due to the dense and tall canopy. The large trifoliate leaves can overlap and shield each other ('shingling') when air-assistance is set too high. So, what can growers do to ensure their coverage is sufficient?

Optimisation of spray machines

It is important to calibrate the spray machine and ensure the water output is as expected. You can then optimise spraying by adjusting the set-up and checking the spray coverage. Water Sensitive Papers are a common and readily available method for this.

Adjustments can be made to settings such as aligning the spray plume to the crop, ensuring that the water volume, air-assistance, and spray quality are correct for the canopy density, and using the correct spray pattern. The objective is for spray coverage to be as evenly distributed over the canopy as possible.

Figure 1. A hand held imaging device and fluorescent tracer were used to access spray deposition

Growers can optimise their spray machine set-up by changing the spray quality (droplet size), and altering the fan speed for the air-assistance. Air-assistance has two main effects on spray application: carrying droplets into the crop canopy and ruffling the canopy to expose leaves and improve distribution. If air-assistance is too high it can cause leaves to shingle, droplets to be blown off leaf surfaces or spray to be carried through or over the canopy, all leading to wastage of plant protection products (PPP).

There are pros and cons of using particular droplet sizes (or 'spray quality'). For a fixed volume of water, smaller droplets lead to greater surface area coverage, but are more affected by wind and evaporation, and may be more prone to drift. Larger droplets generally

provide less surface coverage for a fixed volume of water and are more affected by gravity. They require more air-assistance to carry them but may shatter and splash when contacting the plant surface. When selecting what droplet size to use, pesticide labels provide guidance, but other factors should be considered such as the environmental conditions (e.g. wind exposure), use of adjuvants (e.g. wetters), risk of drift to neighbouring areas, water volume, canopy density. Every situation is different and the best recommendation is to assess the spray deposition using Water Sensitive Papers or the handheld imaging device when it becomes available. The optimal spray setting will change as the crop develops, so repeated assessments should be done throughout the season. Taking a few hours during the season to assess the spray deposition can save huge amounts of time and crop losses from spray mistakes later on.

While there are no rules for how to divide a canopy, a simple method is to use height zones. Three zones would be appropriate: top, middle, and bottom, plus an assessment of the inner part of canopy). It is important to look at both sides of the leaves.

Spray deposition trials

In SF 158, NIAB EMR ran spray trials at a commercial farm to investigate the effects of spray quality and air-assistance. The water volume was fixed at 840 L/ha and hollow cone nozzles were used to provide combinations of very fine spray with full air-assistance or half air-assistance, and medium spray with full air-assistance or half air-assistance. A handheld imaging device and fluorescent tracer developed by Chelsea Technologies Ltd. and NIAB EMR was used for assessing spray deposition; this device is expected to be commercially available in early 2021.

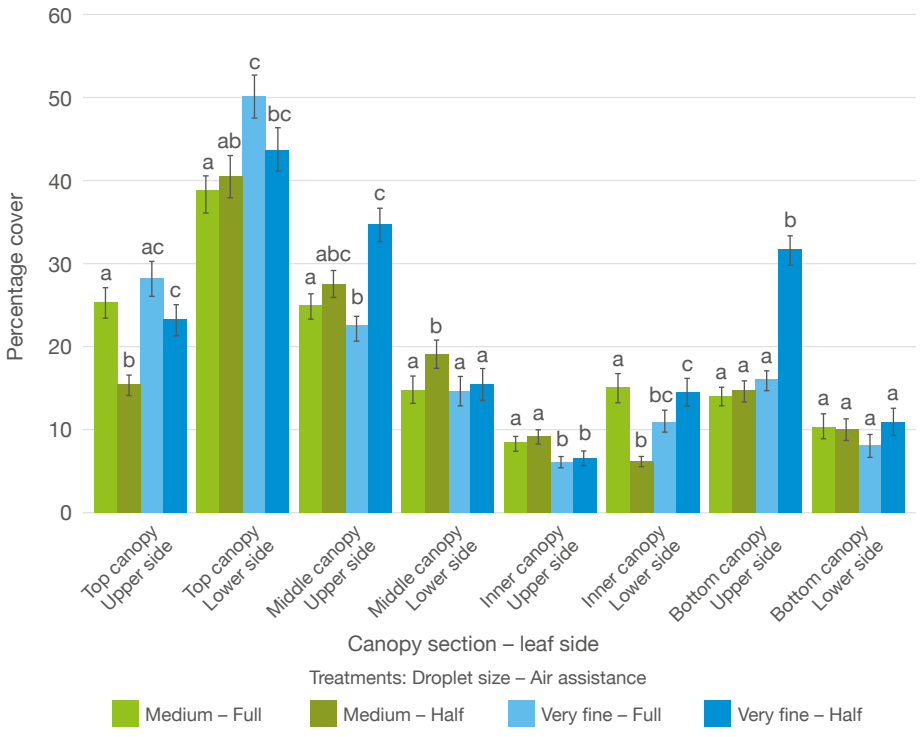

Figure 2. Spray coverage on raspberry plant leaves

Results

Very fine spray quality with air-assistance set to half gave a more evenly distributed spray deposition compared with the other settings. This spray setting gave significantly more spray coverage on the bottom of the canopy upper leaf side (Figure 2). Measuring the intensity of the fluorescent tracer, we found that, although the medium spray quality deposited greater quantities of spray at the top of the canopy, this did not equate to more spray coverage. In comparison, the very fine spray gave less volume of liquid on the leaves but comparable or better spray coverage. While the inner section of the canopy showed less volume of spray and spray coverage, this may be improved by redirecting the air-assistance or nozzles.

The spray coverage achieved in these trials was reasonably good for all spray settings. However, it is notable that, in much of the crop canopy, more than 50% of the leaves sampled had less than 5% spray coverage on. These areas could provide refuges for pests, but also may allow beneficial insects to survive sprays.

KEY POINTS

- Check spray deposition and optimise spray machines before and during the growing season
- Aim for even distribution over the canopy
- Assess whether air-assistance is set correctly. Is spray depositing into the canopy or shooting straight through or over the top?
- Very fine spray with air-assistance at 50% provided the best overall coverage
- Other work by Justas Baroniunas has shown that doubling water volume from 500 to 1,000 L/ha only increased spray coverage by around 15%, with both flat fan and hollow cone nozzles. Relying on increasing water volumes alone may not be enough to achieve sufficient coverage

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Finding robust solutions for **TWO-SPOTTED SPIDER MITE CONTROL**

Work in the final year of AHDB project SF 158 compared four biological control programmes for the robust control of two-spotted spider mite (TSSM) on a commercial raspberry propagation crop, as Elysia Bartel, ADAS Consultant explains.

Two-spotted spider mite is a significant pest on raspberry crops, which are particularly vulnerable to feeding damage. With a very limited range of acaricides available for control of TSSM, Integrated Pest Management (IPM) provides an effective means of control and a solution to increasing acaricide resistance.

The predatory mite *Phytoseiulus persimilis* is commonly released to control TSSM. This can give good control but there are limitations to its efficacy in raspberry production. It feeds only on TSSM so requires repeated release if the pest is absent, and is only effective in a fairly narrow temperature range (15–27°C), while spray products used in raspberry cultivation for control of other pests such as aphids, spotted wing drosophila (SWD) and capsids, can be harmful to *P. persimilis*.

The native predatory mite *Amblyseius andersoni* is more tolerant of spray products than *P. persimilis*. *Amblyseius andersoni* occurs naturally and overwinters in raspberry crops in the UK and, unlike *P. persimilis*, it is omnivorous, feeding on TSSM along with pollen, fungal spores, honeydew and other small invertebrates. It is commercially available and has a wide active temperature range (6–40°C).

In Project SF 158, ADAS compared the use of *P. persimilis* with *A. andersoni* (either with or without a pollen food source called Nutrimite™) to control TSSM in a raspberry crop in propagation. In the first year, TSSM was slow to develop in the crop, therefore *P. persimilis* struggled to establish. Once TSSM was present in September, *A. andersoni* (with Nutrimite™) achieved greater control than *P. persimilis* applied alone. There was no significant difference in TSSM numbers or damage between *A. andersoni* applied with or without Nutrimite™, or between *A. andersoni* applied alone and *P. persimilis* applied alone or together with *A. andersoni*. However, Nutrimite™ significantly boosted the population of released *A. andersoni* compared with releasing *A. andersoni* alone on one date, immediately after transplant to the field. While the young plants were still under protection, releasing *A. andersoni* together with *P. persimilis* significantly increased numbers of *A. andersoni*, suggesting that the *A. andersoni* might have predated *P. persimilis* or their eggs.

The work was continued through winter after an additional introduction of *A. andersoni* was made in September, to compare with the other treatments. All treatments were stored over winter either in a commercial cold store or in ambient conditions. *P. persimilils* and *A. andersoni* were assessed again in March and April.

Low numbers of *A. andersoni* eggs and TSSM and eggs were found on the cold stored plants, showing that *A. andersoni* and TSSM can survive cold storage, whereas *P. persimilis* was not found in any of the samples. There were significantly more *A. andersoni* eggs in the emerging primocane buds where *A. andersoni* had been released with Nutrimite™ compared with where *A. andersoni* had been released alone or alone with an additional autumn release. These results indicated there was no benefit to making an additional release of *A. andersoni* on 5 September.

In conclusion, this work has demonstrated that *A. andersoni* can provide control of a late infestation of TSSM in a raspberry propagation crop and that it can successfully overwinter in commercial cold storage. Nutrimite™ helped to boost the population of *A. andersoni* early in the year which was reflected in increased numbers of *A. andersoni* eggs the following spring.

To find out more about project SF 158, contact your AHDB Knowledge Exchange Manager:

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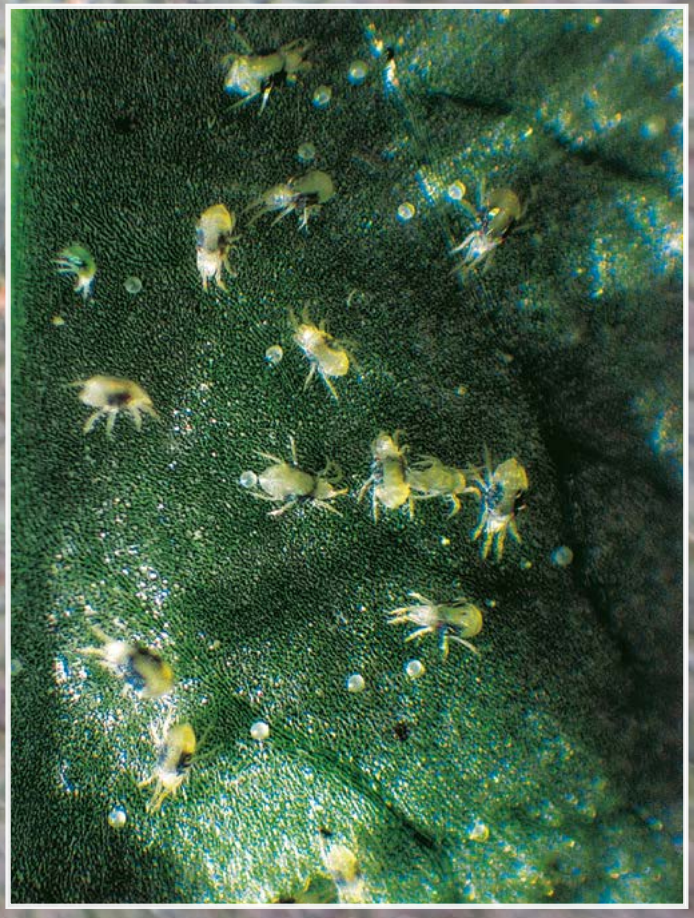

EARLY DETECTION OF **GUMMY STEM BLIGHT** IN CUCUMBERS

AHDB's Cathryn Lambourne, Crop Protection Senior Scientist – Diseases, explores how growers can use the latest research to control gummy stem blight.

Figure 1. Gummy stem blight lesion

> "Once present in the glasshouse, spores from infected plants can also move around and infect other plants"

Gummy stem blight, or black stem, in cucumber crops, is caused by the fungus *Mycosphaerella melonis* (Myco). The disease, more prevalent in crops grown later in the season, can cause serious stem infections, which may result in death of the plant if the lesion is located close to the base. Infections can also start in flowers, often resulting in rots in fruit, which are not always visible until cut open.

Limited access to approved fungicides to control the disease, and the need to take action early, before infections resulted in costly impacts, led the Cucumber Growers Association (CGA) to look for more proactive ways to reduce the incidence and impact of the disease.

Myco infects the crop via spores carried on air currents, which can enter the glasshouse through roof vents. Once present in the glasshouse, spores from infected plants can also move around and infect other plants. Previous work carried out investigated the use of specialist traps positioned in the crop for spore detection (Figure 2). Air is drawn into the trap at a known flow rate, spores are deposited in small tubes which, in the early projects, were sent to a laboratory for testing. The results provided growers with information regarding the presence of infectious particles in the crop and the need to be vigilant and protect developing plants.

From this, the research team was able to determine two key pieces of information that proved helpful in controlling glasshouse infections:

1. Peak spore release occurred between 16:00 and 07:00, which often coincided with optimum conditions for infection, when vents were closed and relative humidity (RH) was higher, indicating that managing RH effectively during these hours might reduce infection.
2. Good hygiene at crop replanting time was extremely important. Removal of old plant blocks from the crop area before replacing with new plants significantly reduced infections in the following crop.

Further development of the technology to help growers monitor risk periods for Myco infection was undertaken at two grower sites during 2018 and 2019 in AHDB-funded projects, CP 137 and 137a.

Figure 2. Burkand air sampler collecting spores in a cucumber crop

These projects successfully converted the laboratory-based test for Myco into a lateral flow test that growers could use themselves in the glasshouse if they deploy spore trapping technology. This has resulted in the full development of a stable ten-minute on-site test for Myco inoculum in air samples collected using spore trapping technology in the glasshouse, giving an indication of disease risk long before infection is visible.

The main financial benefits of using the test, are:

- To reduce unnecessary crop protection inputs
- To apply more timely crop sprays to cucumber cropping systems. Using the lateral flow device, the grower/ consultant will be able to check for Myco spores in the air, and better time the first fungicide application
- Targeted application of control measures will help delay the onset of pathogen resistance to fungicides, thus prolonging their useable life

Additional findings from the project indicated that all of the isolates collected during the 2019 trial were effectively controlled using Plover (difenoconazole) in laboratory tests, while some variability in control was seen during testing using boscalid, azoxystrobin and fluxapyroxad. Fluxapyroxad showed a wide variation in response between isolates, although the chemical was not particularly effective in controlling Myco. These results are based on a single experiment using seven isolates collected from two geographically different areas. While the data is not robust enough to suggest shifts in sensitivity to the active ingredients tested, it does underline the need to employ a good anti-resistance application strategy, whenever possible.

The use of risk monitoring technologies and a strong, well-timed control regime can be effective components of an integrated approach to controlling pathogens in crops.

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Taking control of common viruses in pea and carrot crops

Viruses can cause huge economic crop loss in both pea and carrot crops. Adrian Fox of FERA outlines current research that will underpin future control methods.

FV 459 – Surveillance for viruses in UK pea crops

Pea (*Pisum sativum*) is an important legume crop grown worldwide for consumption by humans and animals. They can be grown in rotation with cereals to help manage disease and improve fertility of the soil. Of the 124 viruses with the potential to infect pea, 27 have been previously recorded in the UK, but only 7 have ever been recorded from UK pea crops.

Many previous reports were based purely on virus symptoms, which may be confused with other biotic and abiotic stresses; they give an indication of the prevalence of virus diseases in pea crops at the time. Most other pea viruses recorded in the UK have been the result of testing small numbers of samples, again the result of diagnostic testing following symptom observation. A key aim of this work is to determine the virus incidence affecting UK pea crops.

In the first year of the project, 20 pea crops were sampled across the UK. The sampled leaves from each crop were then screened for viruses, and smaller bulked samples were then tested for the range of viruses detected in the initial screening. Of the 20 crops tested, 13 were positive for virus infections ranging in incidence from 0.85% to 93.33% estimated infection. One pea virus which has been historically reported as being present in the UK, pea enation mosaic virus (PEMV), was present in 5 crops, ranging from 0.85% to 30.09% virus infection. However, more commonly detected, and present at higher incidence, was turnip yellows virus (TuYV). This virus ranged in incidence from 1.71% to 93.33% virus and was present in 12 of the 20 crops tested. This finding represents a first report of TuYV in UK peas. Additionally, the virus soybean dwarf virus (SbDV) was detected in two of the 20 crops tested, a first record of this virus in the UK. Additional work is investigating the yield impacts of these viruses.

The work has had a temporary hiatus due to the COVID-19 pandemic but is currently planned to continue in 2021 and 2022, and will lead to improved guidance on pea viruses for growers.

Pea crop

Investigating the transmission of carrot viruses to improve management strategies

AHDB has been funding work to investigate the timing, sources, and key vectors of viruses known to cause economic crop losses.

Carrot motley dwarf complex (CMD) is associated with leaf reddening and mottling, and has been linked to loss of marketable yield through excessive lateral root hair development and root splitting (kippering). Carrot red leaf virus (CtRLV), a component of CMD, is necessary for transmission of the other viral components of CMD. Research into the carriers and timing of transmission of CMD can, therefore, focus on CtRLV. The carrot yellow leaf virus (CYLV) is also a concern in mature carrot crops, and previous studies have strongly linked it to the development of internal necrosis in carrot roots.

CtRLV and CYLV are spread throughout crops via aphids. The main carrier of these viruses is likely to be the willow-carrot aphid (*Cavariella aegopodii*) but other species may be implicated. Our research aims to identify the timing of transmission of CtRLV and CYLV throughout the growing season, and to correlate this to aphid flight data gathered from yellow water pan traps in the field. We will also compare the different methods used for monitoring aphid flights (suction trapping and in-field yellow water traps), and whether this new data can be used to refine the current models used for predicting flights of willow-carrot aphid.

In the first year of the study (2019), greater virus transmission was recorded in the trials at Wellesbourne, Warwickshire than at Stamford Bridge, Yorkshire. At both sites, most of the virus detected throughout the growing season was CtRLV, with CYLV only found occasionally. Aphid flights at both sites followed a similar pattern throughout the season, though fewer aphids were caught at Stamford Bridge. The trials at Wellesbourne showed a greater incidence of virus transmission throughout the season, with a peak transmission of 43% plants sampled in the first week of June. Encouragingly, the day-degree forecast for willow-carrot aphid appears to be relatively robust and flights appear to track well with transmission of carrot red leaf virus.

A field trial is planned for 2022 and will focus on approaches to reducing virus transmission, using information from the SCEPTREplus project and other sources.

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Seeking solutions for **WEED CONTROL IN CONTAINERS**

As the number of herbicides available to the hardy nursery stock (HNS) sector decreases, long-term, cost-effective weed control has become an increasing challenge for the industry. David Talbot, ADAS Consultant, explores the likely options.

David Talbot
ADAS Consultant

Identifying potential products

The loss of Ronstar 2G (oxadiazon) and restrictions on the use of Sultan 50 SC (metazachlor) have had a major impact on chemical weed control programmes for container-grown HNS production. Flexidor 500 (isoxaben) – previously Flexidor 125 – does not offer control of key weed species including annual meadow grass, groundsel, willowherb, moss and liverwort. Additionally, only one application is now permitted per year. Devrinol and Venzar 500 SC have both recently been issued an Extension of Authorisation for Minor Use (EAMU) for use in ornamentals, but restrictions limit the use of these products.

In particular, the recently issued EAMU for Venzar 500 SC in ornamentals prohibits its use after the end of July within a calendar year. It is safe on a range of species in late winter and in July when crop foliage starts to harden, but, due to restrictions on the maximum application rate and its short persistence, this herbicide is now most suited to use in tank mixes.

As a result of recent AHDB-funded projects investigating new active ingredients, Dual Gold (s-metolachlor) and Springbok (dimethenamid-P + metazachlor) were developed as container-grown HNS treatments, though with limitations. Dual Gold has demonstrated its potential for use as a summer treatment in combination with Flexidor, although the EAMU for Dual Gold restricts its use to May. This tank mixture will give improved control of grass weeds, groundsel and willowherb, compared with Flexidor alone.

ACTION POINTS

- Tank mixes of Flexidor and Centurion Max or Sunfire appear safe on container-grown HNS
- Tank mixes of Flexidor and Dual Gold appear safe on most crop species when applied in May
- Springbok has potential as a top-up treatment in container-grown production when crop foliage hardens later in the year
- Applying 10 mm of irrigation post-herbicide application could be adopted by growers to help minimise any initial crop damage associated with some treatments
- Integrate non-chemical weed control methods into nursery weed control programmes

While few new residual herbicides show potential for testing on container-grown HNS, two were selected for trials: Sunfire (flufenacet) and Defy (prosulfocarb), both look promising in terms of efficacy on key weed species, and crop safety spectrum.

If an improved EAMU can be obtained, Defy could be a partial alternative to Devrinol (napropamide) as a winter treatment. Defy is in a different Herbicide Resistance Action Committee (HRAC) group from most of the other herbicides that can be used in container-grown HNS production, and has the potential to be a useful addition to prevent the onset of resistance in key weed species, such as groundsel.

The withdrawal of Aramo (tepraloxydim), a selective contact herbicide for post-emergence grass control, resulted in annual meadow grass becoming an increasing problem. However, a safe and effective replacement, Centurion Max (clethodim), has potential for use over most of the crop species tested.

New products such as Sunfire and Centurion Max have potential for use in a tank mixture with Flexidor over foliage on most of the crop species tested. Sunfire is a useful pre-emergence tank mix partner for Flexidor, where annual meadow grass and pearlwort are a problem. Centurion Max is a useful addition to Flexidor, or as a stand-alone treatment for post-emergence control of annual meadow grass, with most crop species overcoming any initial damage.

A new herbicide active (coded HDC H46), approved in other countries, was included in 2018 and 2019 trials and has potential for UK use. It gives pre-emergence residual control of a range of annual grasses, including annual meadow grass, and a range of broad-leaf weeds including: hairy bittercress, common chickweed, mouse-eared chickweed and groundsel.

If authorised for use on ornamentals, HDC H46 has potential as a residual herbicide in programmes alongside Flexidor. As well as providing residual control of many of the key weeds found in container-grown HNS production, HDC H46 has potential for use either alone or in a tank mixture with other products such as Defy and Venzar 500 SC.

Sensitive crop species such as Lavandula should only be treated with herbicides where crop safety has been proven, cultural methods including the use of mulches and pot toppers will need to play a greater role in delivering crop-safe weed control on such species.

To find out more about project HNS 198, contact your AHDB Knowledge Exchange Manager:

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Boosting ecosystem services in newly planted orchards

Dr Michelle Fountain, Deputy Head of Pest and Pathogen Ecology at NIAB EMR, and Celine Silva, Fruit Entomologist at NIAB EMR, explore how natural enemies help provide pest control in apple and pear crops.

Natural enemies help regulate pest numbers, often mitigating the need to spray plant protection products (PPP), and are important in organic and Integrated Pest Management (IPM) systems. They contribute to the control of a range of pests and can help to protect trees against spider and rust mites.

With careful orchard management practices in place, communities of natural enemies build up and become more diverse over time, adding resilience to the pest control in mature orchards. However, when new orchards are planted, the structure (e.g. tree bark and canopy), and flora (alleyways) are often simple, leaving little for these beneficials to feed on, and few refuges to shelter from predators or to overwinter.

In AHDB project TF 223, the team at NIAB EMR, with the help of commercial growers, established six ecologically enhanced quarter hectare plots in newly planted Gala and Jazz orchards. Three treatments were applied:

1. Alleyway sowings of a perennial native flower mix.
2. An earwig refuge in every tree ('Wignests' UKRI project; NIAB EMR, NRI (University of Greenwich), WorldWide Fruit, Russell IPM, Fruition, Agrovista).
3. Hoverfly attractants (provided by NRI, 180 sachets/ha).

In the following two years, a range of monitoring methods were used to quantify the numbers of both natural enemies and pests in the apple trees, and coverage of the sown flora in the alleyways.

Alleyway sowing

Alleyway sowing provided nectar and pollen for natural enemies including parasitoids and hoverflies, helping to boost local pollinator populations over time. Cut just once or twice a year, they also provide structure for web-spinning spiders, and refuge for natural enemies. Sown native perennial flower mixes established well in the alleyways, floral coverage was ~50.6% in year 2 and ~65.3% in year 3. The diverse mix not only increased the complexity of the flora available for natural enemies and pollinators, but is recommended to outcompete undesirable weeds that might establish in unsown alleyways, such as dock.

Positive benefits included a reduction in codling moth damaged apples. Codling moth stings were fewer in years 2 and 3, and there were fewer deep entry damaged fruits in year 2. In year 2, no apple leaf curling midge were observed in the enhanced plots, and aphid numbers were also significantly lower in these plots in the spring.

Earwig refuges

The earwig refuges were clipped into the canopy of the trees, providing shelter to a range of natural enemies including predatory spiders, earwigs, and anthocorids. The majority of the spiders using the Wignests were orb-weaving species, but five other groups were also recorded including a group exclusively found in the Wignests, which actively hunt at night (sac spiders). Importantly, the Wignests also ensured that earwigs were foraging in the canopy of the trees when feeding at night.

Hoverfly attractants

Finally, the hoverfly attractant brought these highly mobile insects in from surrounding areas to lay eggs in aphid colonies, contributing to control. More adult hoverflies were observed flying in the treated plots and lacewings in the canopy of the apple trees in year 2. Most markedly, spiders were more abundant in the day, and at night, in the ecology sections of orchards, especially money spiders. Overall, eight predatory spider families were identified in the canopy of the apple trees, with a higher diversity in the ecologically enhanced plots.

Looking forward

Limited monitoring will continue in 2020, but it is evident that there are already benefits from enhancing the ecology of newly planted orchards. There have been learnings along the way – the most important is the establishment and management of the floral alleyways. We used a 20% forb, and 80% non-competitive grass mix – making it more affordable. Flora included Yarrow, Knapweed, Oxeye daisy, Birds-foot trefoil, Selfheal, Red Campion, and Red Clover, giving a good diverse mix of flower types.

To find out more about project SF 158, contact your AHDB Knowledge Exchange Manager:

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KEY POINTS

- Use a perennial native mix for long life and UK adapted plants
- Tailor your mix to soil type
- In spring or autumn, prepare a good seed bed
- Broadcast the fine seed mix and then roll to press the seed to the soil surface
- Overhead irrigate if the forecast is dry, to germinate the seed
- Once growing, mow the alleyways, as needed, to ~10 cm height in year 1 – this will prevent flowering and help the forbs put energy into leaves
- From year 2, the general advice is a single cut before harvest but this can be adapted to your requirements, e.g. an additional midsummer higher cut – depending on weather conditions and growth

CONTROLLING APHIDS IN STRAWBERRIES

Aphid control has become increasingly difficult for strawberry growers with fewer pproved aphicides and lack of reliable biocontrol methods. Scott Raffle, Knowledge Exchange Manager, explores how AHDB Project SF 156 sought to identify alternative control products and develop novel control techniques.

> “Planting garlic in strawberry bags under tunnels, regularly cutting their leaves and placing them in the crop canopy, resulted in reduced numbers of strawberry aphids in a one-year trial.”

Hallmark, with or without Silwet, in tunnel-covered field-grown crops gave 100% control of potato aphid in field trials when applied by knapsack sprayer. Calypso gave moderate control initially, but aphid numbers increased after a few days. Control improved when the product contacted the aphids. Chess controlled potato aphid but only when mixed with Silwet and when the spray contacted the aphids. Of these existing aphicides, approval for pymetrozine (Chess) has lapsed and approval for thiacloprid (Calypso) will lapse after 2020.

In a screening trial to assess alternative aphicides for the control of the potato aphid, and melon and cotton aphid, a single application of the approved product Batavia or the coded product AHDB 9966 gave durable (up to 3 weeks) and effective control. A second coded product AHDB 9951 also showed promise against both species. AHDB is seeking approval for the coded products.

The naturally occurring aphid predators *Aphidius ervi* (*A. ervi*) and *Praon volucre* (*P. volucre*) were recorded in commercial strawberry crops and offered control, but *A. ervi* needs temperatures >8°C and *P. volucre* needs temperatures >12°C to be effective. Both will work early in the season but only when these temperatures are achieved as they are less effective at lower temperatures.

In a season-long strawberry farm survey of natural predators of aphids, the most commonly found aphids were potato aphid, and melon and cotton aphid, with the main predators being green lacewing, hoverfly larvae, *Aphidius* and *Praon* species. Aphid numbers peaked in early June with predators peaking in early July, so the predator numbers caught up with the pest population and suppressed aphid numbers in July.

Planting garlic in strawberry bags under tunnels, regularly cutting their leaves and placing them in the crop canopy, reduced numbers of strawberry aphids in a one-year trial. There was no effect on numbers of predatory mites or thrips numbers. The strong scent given off is thought to act as a repellent to a number of pests but with the trials having only run for one year, it is too early to make bold recommendations on these results.

To find out more about project SF 156 contact your AHDB Knowledge Exchange Manager:

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GUIDANCE FOR GROWERS

- Improve the coverage and penetration of the plant (particularly the undersides of leaves) when applying control sprays, and adopt one of a range of techniques to assess the level of coverage they are achieving
- Apply control products to existing aphid populations in the autumn to reduce spring populations. Avoiding the need to spray aphids in spring will reduce possible adverse effects on natural and biological control of aphids and other pests
- Carefully monitor both aphid numbers and their associated natural enemies within crops, to determine the need for control sprays
- Do not treat all fields the same. Consider the species of aphid prevalent and the damage it may cause including plant virus spread
- Follow resistance management guidelines on control product labels and rotate between products with different modes of action. Populations of some aphid pests such as the melon and cotton aphid (*Aphis gossypii*), have developed resistance to certain products
- The control products Hallmark and Batavia both provided effective control in this project. Hallmark is generally incompatible with most predators, although a single application had no adverse effects on *Neoseiulus cucumeris* in this project. Batavia's compatibility with naturally occurring and introduced predators is unknown; use early in the season to meet the harvest interval (14 days before the start of flowering)
- Natural predators can be relied upon to gain control by late summer but use other control measures early in the season, for example, boosting numbers of parasitoids with early releases of commercially available products
- Consider early season releases of *A. ervi* to control potato aphid when daytime temperatures exceed 8°C regularly for at least part of the day. *P. volucre* is currently only available as part of a mix of parasitoid species (including *A. ervi*) and may also be considered for releases when daytime temperatures exceed 12°C regularly for at least part of the day
- If planning to test garlic intercropping to control aphids, plant a hard neck variety such as 'Violet' in autumn for control the next year. For maximum effect, consider planting at 1 m intervals. When garlic is established, snap leaves at least fortnightly and lay on the strawberry crop
- Always consult a BASIS-qualified agronomist before choosing to use crop protection products

New strategies to manage and control codling and tortrix moths

AHDB's Fruit Knowledge Exchange Manager, Scott Raffle, investigates new options for moth control in apple orchards.

Codling moth adult

Codling moth sting on apple

Codling moth larva in apple

Growers traditionally rely upon conventional spray control products to reduce populations of codling and tortrix moths at levels that are not damaging to apple and pear crops. However, the numbers of these pests that overwinter are still sufficiently high to instigate new attacks the following season. A new strategy is required to reduce our reliance on spray products and avoid new attacks each year. In Project TF 223, NIAB EMR and ADAS assessed sex pheromone mating disruption techniques along with use of predatory nematodes, to improve levels of control and avoid repeated use of conventional spray products.

The sex pheromone mating disruption product RAK 3&4 provided similar control of codling, fruit tree tortrix and summer fruit tortrix moths when compared with conventional spray programmes in field trials. However, it did not provide complete control so it may be necessary to employ additional sprays, should monitoring trap catches of moth pests exceed damage thresholds, especially in early ripening apples and pears, which are more vulnerable.

Initial trials demonstrated that codling moth larvae are susceptible to a mix of predatory nematodes (*Steinernema carpocapsa* and *Steinernema feltiae*), but the pupae are less susceptible, and further field trials are required to repeat these results. As RAK 3&4 is specific to codling and tortrix moths, other moth pests such as *Blastobasis lacticolella* can increase in population where other lepidoptera control agents are not being used. In this work, we identified a female sex pheromone of Blastobasis, but were unable to attract males while using it in trials.

KEY ACTION

- Employ mating disruption technology for codling and tortrix moths, to reduce reliance upon conventional spray programmes, but, where pest pressure is medium to high, be prepared to apply an additional spray to early ripening or vulnerable apple and pear cultivars
- Monitor closely for other pests and, in particular, tortrix species and blastobasis caterpillars, which may occur due to limited use of lepidopteran control products
- Even if you have no previous experience of blastobasis in orchards, it would be wise to continue to monitor as populations may build up locally over years
- Consult the AHDB ***Apple Best Practice Guide*** on how best to do this
- Always consult a BASIS-qualified agronomist before choosing to use crop protection products

To find out more about project TF 223, contact your AHDB Knowledge Exchange Manager:

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Maximise your profits

and prepare for 2021 with our new online course

> We are showing participants how to prioritise improvements that generate the biggest saving for their business with little or no capital investments so as to maximise payback

The 2020 season has thrown numerous challenges at the UK horticulture industry. Whether it be labour availability, travel restrictions, social distancing or extremes in weather, it's been a season unlike any other. In response to this, we have launched a series of online modules aimed at improving efficiency and productivity, helping businesses prepare for the coming season.

Using the results of the AHDB labour market barometer, we have been able to observe trends and challenges as the season has progressed. It has been apparent that businesses were able to adapt to reduced labour availability, but that this was often at a cost. Whether it be due to increased overtime or, in extreme cases, crops being left unharvested, businesses were reporting a significant drop in productivity.

SMARTHORT

The SmartHort campaign shares knowledge about how to improve management practices to help with recruitment, retention and labour efficiencies, as well as accelerating automation and robotics for longer-term solutions.

Building on the experience gained through our 2019 Strategic SmartHort Centres, we are again working with Fedden USP, expert Lean consultants, to help the horticulture industry to adopt new ways of working to save both time and money. We are delighted to be working with 10 businesses, who have embarked on our innovative series of digital modules, working through the principles of Lean and receiving practical training on how to implement change within their business. If you weren't able to join us this time, you can still view session content via: **ahdb.org.uk/smarthort/lean-modules**

To find out more about the programme, we spoke to Neil Fedden from Fedden USP about what the course involves, the topics covered and what businesses are gaining from taking part. "The Lean modules cover productivity and business improvement techniques that originated from the Japanese automotive industry and have now been adapted to apply to the horticulture and agriculture sectors. We've got a fantastic range of horticulture-specific examples that we are able to bring to these modules," says Neil.

"Topics include how to identify productivity improvements within a growing environment, using techniques such as process maps, waste walks, activity sampling, workplace organisation, etc.

"The SmartHort campaign shares knowledge about how to improve management practices to help with recruitment, retention and labour efficiencies, as well as accelerating automation and robotics for longer-term solutions.

"We are also identifying and managing performance and improvements on an ongoing basis to introduce the idea of continuous improvement to the businesses taking part," Neil adds. "Participants are shown how to prioritise improvements that generate the biggest saving for their business with little or no capital investments so as to maximise payback.

"There is a practical focus to the modules and we provide step-by-step guides on how to reduce business waste and improve productivity. Implementation of these practices is often low-cost and relatively instant; it is not unusual to see productivity improvements of 10–15% being achieved, sometimes even higher," Neil points out.

"The improvement techniques apply to all aspects of the business, from growing, picking, packhouses, offices, maintenance, etc. and we're confident that those taking part will gain from the course.

"There are four modules, split into 16 two-hour weekly online workshops to allow participants to remain on site while receiving the training and reduce the impact on already busy diaries. Participants are also encouraged to trial the various Lean techniques in their own business and feedback what progress they have made and raise any issues that they need support to overcome. This improves the transition from theory to practical application," Neil explains.

"The theory and guidance within the presentations will be uploaded to the AHDB website for businesses so those who have been unable to take part in the training element can still benefit." To view these videos or find out more, visit **ahdb.org.uk/smarthort/lean-modules** or if you have any questions, please contact Gracie Emeny on **gracie.emeny@ahdb.org.uk**

How resilient to water risks is UK production?

A recent Cranfield University project funded through the Global Food Security's Resilience of the UK Food System Programme assessed UK growers' attitudes to water risks. AHDB's Nicola Dunn and Cranfield University's Chloe Sutcliffe highlight the key findings and implications for UK growers.

There were 118 responses to a farmer and grower survey from across the UK, with responses from potato growers, field vegetable, soft fruit and tree fruit sectors. The survey took place before the 2018 drought, but responses showed that water shortages were of most concern to growers, more so than water quality or flooding issues.

The importance of reservoirs

Farm reservoir storage is important across the whole country, with around half of respondents making use of storage. In water-scarce areas, there is more reliance on groundwater than surface water, reflecting uncertainties around in-season restrictions for surface water direct spray licences. Unsurprisingly, renting land with access to water is widely reported as a strategy for managing irrigation water, and growers in water-scarce areas are members of abstractor groups to manage the issues.

Growers feel that reservoirs most improve their resilience. Investment in extra storage through reservoirs is prevalent, though most likely for those who already have some reservoir storage. Reservoir ownership was notably skewed towards enterprises farming larger areas, and shared reservoirs are seen as an option for the future.

Irrigation management

Growers are interested in increasing irrigation efficiency to improve crop productivity and quality, but not intending to use greater efficiency to reduce water use overall. Methods used include switching application methods and irrigation scheduling. When it comes to managing irrigation, adoption of water-efficient techniques is more prevalent in water-scarce counties, and there may be a gap in the uptake of scheduling technologies in less water-scarce areas. This could be a key area for growers in these areas to consider in future, should licence volumes be reduced through the Environment Agency's ongoing work on abstraction reform.

Many growers indicated that they would be unlikely to switch to solid set sprinklers or drip irrigation and there are knowledge gaps in the areas of deficit

irrigation and thermal imaging to assess heat stress necessary to determine if these would be useful. Growers access information on irrigation technology from companies and agronomists, with those in water-scarce counties more likely to be in touch with abstractor groups or the UK Irrigation Association.

Overall, growers believe that investments in irrigation efficiency are worth the expense, although there were some concerns about 'technological lock-in' and reducing flexibility to try different options in future. Despite widespread recognition that trickle irrigation can significantly increase the efficiency of irrigation, rain guns are still preferred by many growers, due to greater flexibility and lower investment requirements.

Soil and water management

Soil and water management strategies currently being used include land drainage, cover crops, weed removal and tied ridges. A small percentage of growers report that they are changing crop cultivar to manage plant water use.

Regulatory blocks

Licence restrictions such as Hands-off Flow conditions and 'Section 57' restrictions on spray irrigation are of most concern, with growers noting that the risk is greater now than in the past, and that the threat to production is increasing.

There are concerns in the industry over current regulatory approaches, which may act as counter incentives to enhance irrigation efficiency, e.g. 'use it or lose it' in relation to losing headroom on licences. Potato and field veg growers strongly support flexible water trading arrangements to provide resilience to water risks.

Next steps for growers

Researchers have recognised that some of the most widely preferred resilience-enhancing strategies (e.g. reservoirs or technologies to increase irrigation efficiency) can be expensive and most accessible to larger businesses. However, it is notable that other options for building resilience include engaging with other growers, e.g. via water abstractor groups. This permits growers to work together to coordinate informal water-sharing arrangements during droughts and to lobby for changes to the regulatory environment, including water trading arrangements. Collaborative working between enterprises may provide options for facilitating enhanced water access or sharing equipment or reservoirs. We would encourage growers to consider joining such groups or beginning these discussions to help ensure the industry is resilient to future water risks.

At AHDB, water management is a key component of our cross-sector Environment Programme. Our work, in line with these findings, will focus on demonstrating new technology or management tools through our Farm Excellence platform, and ensuring that new research is translated into tools and guidance that can be put into practice. More information can be found at **ahdb.org.uk/weather** The water strategy for agriculture and horticulture published in 2020 can also be found at **ukia.org/pdfs/irrigation-strategy-2020.pdf**

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> "Farm reservoir storage is important across the whole country, with around half of respondents making use of storage"

New lease of life for **CLIMATE CHANGE LEVY DISCOUNT**

NFU Energy explores what the extended two-year Climate Change Levy discount may mean for Growers.

What is the CCA/CCL scheme

Eligible horticultural businesses that sign a Climate Change Agreement (CCA) receive a discount to their Climate Change Levy (CCL), the tax added to electricity and fuel bills, in return for reducing their energy use and carbon emissions in line with agreed targets. Discounts represent considerable savings and are currently 92% for electricity, 81% for natural gas, and 77% for LPG.

This scheme, which has been operational for over 15 years, was set to end in March 2023. However, in the Spring Budget, the Government announced a two-year extension to the current scheme and then published a consultation containing the detail, which closed in June this year.

While, at the time of writing, not all the fine detail is known, the extension stretches the discount period to March 2025, although new targets will be put in place around a new base year period. The scheme was opened until 30 September to allow new entrants from eligible businesses for the first time since October 2018.

The Government is considering a future scheme beyond March 2025, as CCA's have demonstrated their value in achieving carbon and energy reductions.

Value of the scheme

The scheme benefits 150 or so of the high energy-intensive horticulture business in the UK, a mix of edibles, ornamentals and soft fruit producers. In return for providing information demonstrating progress against achieving energy reductions, these businesses receive a combined discount worth over £3.5m per year, dominated by the savings in the edible sector – where energy consumption is highest.

While the scheme is not only open to horticultural business, the sector does lead the agricultural participation, with some £16m of discount having been accessed by participating businesses since 2005. A major change in CCL rates and discount levels saw the value almost double from 2019 onwards.

It's not all about saving money

The scheme allows government to reward highly intensive energy users who commit to reducing their energy consumption. In this, it has been a relatively successful and stable part of the Government's energy policy, which is why a successor scheme is being discussed.

In responding to the consultation for the changes and the consideration of the new scheme, NFU Energy as scheme administrators made representation to the Government about the need for assessing improvements on a carbon savings basis, not purely energy reduction. This way, the impact of changes made over the last 10 years in installing and using renewable energy can be demonstrated and accessed, to help government and agriculture in achieving their Net Zero Carbon Emission aspirations.

Make sure you keep good records

If you are a participant in the scheme, it is important to take and keep good records. As part of your agreement, records must be kept for at least four years after the scheme closes, i.e. until 2029. These records must also contain the details of the original base year data of 2008 as a demonstration of energy consumption over which targets were set. Where production forms part of your return, these records must also be kept.

How the targets work

Targets are expressed as a percentage reduction in energy use measured against a specified 'base year'. They are set for your sector – e.g. horticulture – and apply equally to all participants in that sector.

You must report your energy and production data, currently every two years, to show whether you have achieved the target. If you fail to meet the target, you have the option to leave the scheme and stop receiving the discount or 'buy out' your shortfall.

Who is eligible?

You are eligible to be part of the CCA scheme if you operate in the horticulture, pig or poultry sectors and carry out one or more of the processes listed as eligible under the scheme rules. You can find a list of these processes, plus full details of the scheme as it applies to your sector at **ccl.nfuenergy.co.uk/about**

To find out more about the scheme, please give the NFU Energy Team a call on 024 7669 6512.

To find out more about GrowSave, contact your AHDB Knowledge Exchange Manager:

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EXPLANATORY NOTE

The NFU is the trade association responsible for the horticulture, pig and poultry CCA schemes. NFU Energy administers the schemes for the NFU and provides expert help and guidance to members of the scheme. There is an initial registration fee to set up a participant's CCA, plus an annual membership fee to cover ongoing advice, administration and support, including the collection and processing of data returns to the EA.

Assessing the impact of **coronavirus on labour**

The Horticulture Labour Barometer provides information on the real-time labour requirements from a sample of edible horticulture producers in both England and Scotland. AHDB's Gracie Emeny outlines the thinking behind this project.

Due to the coronavirus pandemic, March and April this year were full of uncertainties. Would garden centres reopen in time to sell stock? Would consumer shopping habits significantly change? Would companies be able to source enough PPE? Certainly, one of the most common concerns was around labour availability. Would we be able to source sufficient workers for the season? If not, what would the knock-on effect on the industry be?

As we all know, the UK horticulture industry relies on a high level of seasonal labour each year. With the effects of coronavirus on the availability of labour unknown, due to numerous travel restrictions early in the season, there was real concern that there may be a shortfall in seasonal labour for the 2020 season. In order to better understand the possible impact, and provide government and industry with real-time information on access to, and confidence in securing, labour for the duration of the season, the Horticulture Labour Barometer was launched.

Until the project started, there was no real-time data-collection exercise in place to independently monitor the labour requirements and possible shortfalls of UK horticulture businesses. That's not to say that there aren't other extremely useful surveys carried out regarding labour use and numbers. NFU, ALP and Defra all carry out such activities and, although they are not performed weekly, when combined with the results of the barometer, should give a thorough and comprehensive overview of the season, highlight any concerns and demonstrate if and how growers were mitigating issues with access and increased costs.

In order to ensure that we had sufficient industry representation to provide a snapshot of the season, we contacted a number of companies and cooperatives in early May to invite them to participate. There were over 40 companies involved, representing the field vegetable, soft fruit, tree fruit and protected edible sectors. When the barometer was launched, the decision was taken not to include ornamental businesses, due to the uncertainty surrounding garden centre closures, but the option to include later in the season was left open if it became apparent that there were problems being faced.

Once we had established a core grower sample, we began with understanding the baseline through kick-off questions. These were then followed by a set of short weekly questions throughout the 2020 season, running from June until October. At the time of writing, we have received data from businesses, representing a need for in the region of 23,000 seasonal workers.

The barometer was designed so that any trends throughout the season could be seen at a regional and sector level. This helped us to identify specific sectors and/or regions that might be facing challenges. By regularly reporting the results to Defra, Scottish Government, Welsh Government and industry partners (such as NFU and BGA), we are able to ensure that key issues are reported as soon as possible, rather than waiting until the end of the season.

While at the time of writing we haven't completed the evaluation report, it is evident that the majority of businesses have been able to adapt to the changing situation, and their confidence in sourcing the number of workers required appears to have increased as the season progressed. It is also clear that the cost implications of adapting to coronavirus restrictions have been felt by the majority of companies involved.

In mid-June, contributors were asked a supplementary question around whether they have experienced cost increases this year as a result of coronavirus, with 86% of the companies who responded saying that they have experienced additional costs. The most common reasons behind these increases were:

- Procurement of PPE
- Reduced productivity
- Recruitment of staff (including chartering own flights and recruitment fees)
- Social distancing (affecting the number of staff in vehicles, accommodation, work areas, etc.)
- More equipment/hardware (e.g. installation of screens and handwash stations)

To help address reduced productivity, a series of online modules to train businesses in the background and processes involved in LEAN have been developed. Building on the work in our Strategic SmartHort Centres in 2019, we are providing companies with the opportunity to access training, templates and support to implement LEAN without having to leave their sites.

To see the results and outcomes of the Horticulture Labour Barometer, and to find out more about our LEAN support modules, visit **ahdb.org.uk/horticulture**

If you have any questions about the barometer, please contact:

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MAKING IPM THE ‘NEW NORMAL’

AHDB’s Head of Crop Health and Integrated Pest Management, Paul Neve, updates us on this exciting new programme.

For many horticultural growers, Integrated Pest Management (IPM) is not ‘new’, and its use for pest, weed and disease control is already ‘normal’. The horticulture sector has led the way in developing and adopting IPM practice and while pesticides remain an important part of IPM, constraints on the use of conventional crop protection chemistry continue to mount. Pesticide resistance, regulatory, technical, environmental and consumer pressures mean that the availability and use of conventional chemistry will continue to decline. Evidence increasingly suggests that future agricultural and environmental policies will seek to reduce pesticide use and promote IPM. For these reasons, it is important to continue to develop IPM thinking and approaches, and to ensure that farmers and growers are properly rewarded for the IPM that they already do.

The core of AHDB’s IPM programme is to make these principles and practices simple, relatable, and actionable. We are adopting a *Prevent*, *Detect*, *Control* mantra and defining IPM as a coordinated strategy for the prevention, detection and control of crop pests, weeds and diseases, to limit their impact, optimise production and limit environmental impacts.

Prevention

A range of approaches that can limit the potential for major pest and disease outbreaks and epidemics is key. These approaches may include the selection of tolerant or resistant varieties where these are available, and hygiene, biosecurity and physical barriers to limit the introduction and spread of pests and diseases into, and between, cropping and growing systems. Crop rotations to limit pest and disease

pressure, and habitat and environmental manipulation to maximise the presence of natural enemies or limit numbers of pests are other important examples.

Detection

Monitoring, surveillance, and the use of thresholds is an important part of IPM. The last few years have seen rapid advances in sensor and diagnostic technologies, which can greatly enhance real-time and automated pest, weed and disease detection. These new sources of data can be combined with climatic and environmental data, and farmer/grower management data to improve capacity to detect and respond to pests and diseases. In future, these technologies will help ensure that crop protection is applied when and where it is needed, improving efficacy, saving money, and reducing environmental impacts.

Control

There will always be a need for cost-effective interventions to control pest and disease outbreaks. Conventional chemistry will remain an important part of the toolbox and AHDB will continue to ensure that growers have access to conventional plant protection products. However, it will be increasingly important to integrate chemical, biological, and genetic control, to limit resistance to any single control strategy.

The Crop Health and IPM team will use the *Prevent*, *Detect*, *Control* approach as a framework to develop IPM strategies. We are currently embarking on a series of 'horizon' scans, looking at the availability of tools for the prevention, detection, and control of major pest, weed and disease threats. We will use this to identify what is currently working, where there may be gaps, and opportunities to develop new tools and approaches to enable IPM, and how this knowledge can help to prioritise future research. Ultimately, our aim is to provide growers with the information they need to gain confidence in adopting additional IPM strategies in their production systems.

The IPM programme will have five high-level aims, (see the diagram below). Stocking the crop protection toolbox to ensure access to diverse tools for prevention, detection, and control. Putting the 'I' in IPM, particularly through more concerted efforts to monitor IPM practice and outcomes on farm. Developing an IPM knowledge hub as a 'one-stop shop' for IPM advice and information. Working with partners to promote IPM practice and, finally, the development of a robust and recognised set of IPM metrics to ensure that growers' current and future IPM practice is measured, acknowledged and rewarded.

To find out more, contact your AHDB Knowledge Exchange Manager:

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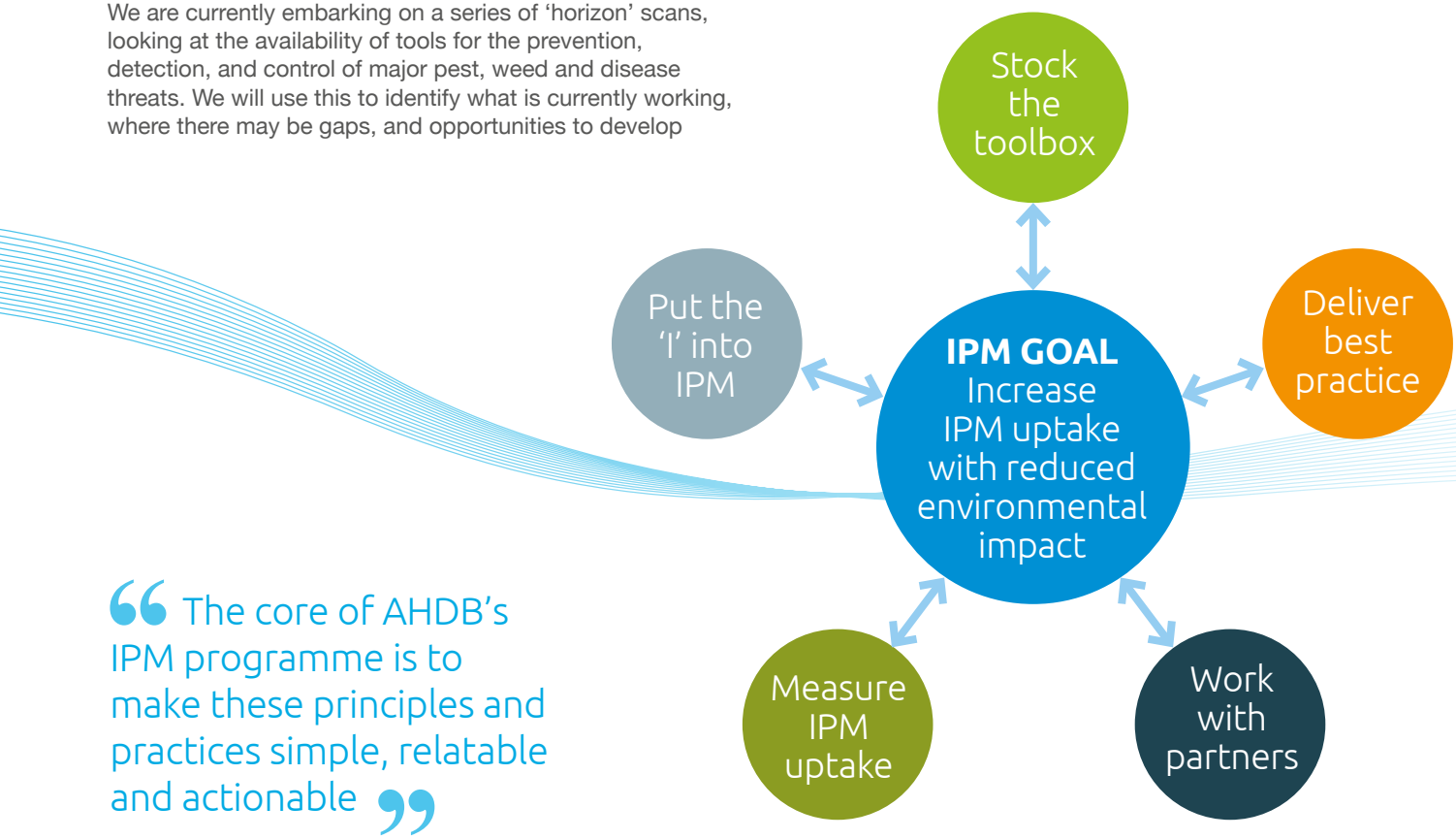

> "The core of AHDB's IPM programme is to make these principles and practices simple, relatable and actionable"

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