

Pollinating insects in UK perennial crops

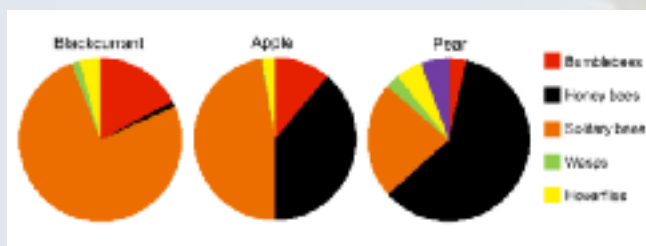
Globally, more than 75% of the world's crops are thought to require insects for pollination. In the UK, pollination is worth more than £400 million per year, of which £200 million represents the UK fruit industry and £102 million is for the apple industry alone.

Decreased number of insect pollinators have been reported for several years, although the factors relating to this decline have been many and varied. This is set against a background of increasingly intensive horticultural production methods, with fewer long-lasting wild flowers and more fruit blossoms per hectare of land that require pollination.

Consideration therefore needs to be given to the role of crop pollinating insects in Best Practice Guidelines for growers. The first step is to determine which pollinator species are the most important for each crop.

Several projects have been undertaken at EMR, including research to identify insect foragers on crop flowers, to establish insect pollinator effects on fruit quality, to determine differences between crops and to supplement the natural population of pollinators with managed bees.

Surveys of apple, pear and blackcurrant orchards were done to identify the most frequent insect visitors to blossoms.



In apple, insect visits were dominated by honey (*Apis mellifera*), bumble and solitary bees including *Bombus (terrestris/lucorum)* and *lapidarius* and *Andrena (dorsata, haemorrhoa, nitida)*. Results indicated that the number of bees visiting pear and blackcurrant were about half the number of those visiting apple blossoms. *A. mellifera*, *A. dorsata* and *A. haemorrhoa* were dominant in pear. Honeybees were of little importance for blackcurrant pollination with *A. dorsata*, *A. haemorrhoa*, *A. flavipes* and *Bombus (terrestris/lucorum)* and *lapidarius* dominating. *A. dorsata* and *A. haemorrhoa* were common solitary bees on all three crops. The percentage of solitary bees visiting the crops that were males also varied between crops ranging from only 7% in apple, to 68% in pear and 84% in blackcurrant.

Fruit quality experiments in pear and blackcurrant indicated that fruit set was significantly reduced by up to one third, where insects were excluded from the blossoms. The number of developed seeds in pear was significantly reduced which meant more misshapen fruit at harvest.

Further experimentation will now be undertaken to determine the efficacy of the main insect visitors in transferring pollen, typical populations of pollinators for each crop the habitat needs of the key players, and the resistance and resilience of the pollinator populations.

Michelle Fountain

Projects were sponsored by the Worshipful Company of Fruiterers, GSK, HDC and HortLINK.



Solitary bee

Agri-Tech Strategy launched at EMR

On Monday 22 August, the government announced a £160 million technology boost for UK agricultural industries, at a launch event at EMR, attended by Rt Hon. David Willets from the Department for Business, Innovation and Skills and Lord de Mauley from Defra. The Strategy aims to deliver sustainable, healthy and affordable food and to ensure that the UK will become a world leader in agricultural science and technology. EMR was chosen as the launch venue, as it represents an exemplar model of science delivering results to the benefit of industry and the consumer.



David Willets with EMR's Clare Hopson



A grand visit

Charles Wellington and Sarah Gersbon receive a portrait of their Grandfather; and EMR's first Director, Captain Robert Wellington, from Will Sibley, Chairman of the East Malling Trust.



AWARDS

Best Small Stand in Show

EMR's stand won "Best Small Stand in Show" at the National Fruit Show in October. The stand recreated a laboratory and office setting from 1913, when a fruit research station was first established at East Malling. It traced the story of how, from small beginnings, a group of dedicated staff made significant progress in the areas of rootstock development, pest and disease management, breeding and fruit storage, to transform the UK's horticulture industry. A century later and EMR is a centre for strategic and applied horticultural research of global importance.



EMR strawberries make a splash

It's been a busy year of recording for TV in 2013, particularly for EMR's strawberry team who featured on several high profile shows including Summer Supermarket Secrets with Gregg Wallace, Paul Hollywood's Pies and Puds, and Nigel and Adam's Kitchen Farm.



EMR sponsor award

EMR have sponsored a new category "Soft Fruit and Cherries" in the Taste of Kent Awards. The Awards, organised by Produced in Kent, showcase the best of Kent's food and drink products. EMR's Chief Executive Peter Gregory, expressed delight in sponsoring this new category involving key summer fruits in EMR's portfolio. He said "It reflects EMR's acknowledgement of the importance of quality to consumers and the benefits to freshness, nutritional value and food security, that local and regional sourcing can bring."

Award for David Simpson



David Simpson has been awarded The Worshipful Company of Fruiterers, 'Fruit Culture Award', in recognition of his outstanding achievements as a UK strawberry breeder.

The award was presented by Prof. John Price, Master of the Worshipful Company of Fruiterers, at the National Fruit Show dinner in October.

During his 30 year career at EMR, more than 25 new varieties have been released from his breeding programme, including 'Malling Centenary' launched in 2013 to mark 100 years of research at East Malling. Over 250 million plants have been sold worldwide and these varieties have significantly extended the cropping season and transformed the economics of strawberry production. In recent years, David has led advances in the molecular analysis of the strawberry genome that will aid strawberry breeding in the future.

NEWS

Changes in Grandfather Rights

After 26 November 2015, everyone who uses Plant Protection Products (PPSs) authorised for professional use, must hold a Certificate of Competence. In addition, after 26 November 2015, it will be an offence to purchase PPPs authorised for professional use, unless the purchaser has ensured that the intended end user holds a Certificate of Competence.

If born before 31 December 1964 and currently spraying crops, land, produce, materials and buildings (including building contents) under Grandfather Rights, which are owned, occupied or rented by you or your employer, you must either:

- Obtain an existing Level 2 Safe use of Pesticides qualification, i.e. PA1 Foundation Module and at least one application module, for example PA6 Hand Held Applicator or PA2 Ground Crop Sprayer
- or
- Obtain the City & Guilds Level 2 Award in the Safe Use of Pesticides Replacing Grandfather Rights (PAGR). Only a person born before 31 December 1964 will be permitted to register for PAGR

PAGR is specifically for those who were previously exempt under "Grandfather Rights" who apply pesticides on land they own or occupy or their employer owns or occupies.

The qualification will consist of four units. Unit 1 is compulsory and you must then select one or more of the optional units, 2, 3 or 4.

Unit 1: Principles of Safe Handling and Application of Pesticides on Own Land

All candidates for PAGR will take Unit 1. It will be assessed verbally and covers the principles of safe handling and application of pesticides.

Unit 2: Hand held pesticide application on own land

Covers all hand held applicators that are commonly used to apply pesticides. A candidate who achieves Units 1 and 2 will be entitled to use any hand held sprayer or applicator only on their own land or that of their employer.

Unit 3: Operating machines to apply pesticides to own land

Covers all machinery and equipment commonly used to apply pesticides. A candidate who achieves Units 1 and 3 will be entitled to use any machine or equipment that applies pesticides only on their own land or that of their employer.

Unit 4: Application of pesticides using other specific equipment or methods on own land

Covers all other types of machinery or equipment. There will be specific endorsements for each item of equipment. A candidate who achieves Units 1 and 4 will be entitled to use only the item endorsed on their own land or that of their employer.

East Malling Short Courses

Please contact East Malling Short Courses if you would like further information or would like to arrange any of the training mentioned above. Short.courses@emr.ac.uk; Tel: 01732 523755



A busy year at EMR

Well, after the cold start to the year it turned out to be quite a good season for our top fruit with the yields of Conference pear averaging 47 t per hectare across the four growing systems in our Concept Pear Orchard. Apple yields have also been pretty respectable so it has been a good year at the practice end of our business.

Good things have happened elsewhere as well, as we have continued to celebrate our centenary. Our Open Day on 14 September attracted over 700 people of all ages for a day in which we were able to pitch our science at a receptive audience and engage with them about the challenges facing the horticultural industries. From the many comments that I received on the day, I know that the infectious enthusiasm of all of the staff was greatly appreciated; from those demonstrating the emergency generator, selling our produce, issuing the entry tickets to those explaining the science in the potting shed, glasshouses and main lecture theatre, all did a great job in promoting the values built at East Malling over the last century.

In early November we held a two-day conference on "Fruits and Roots: A Celebration and Forward Look" to celebrate the science that EMR is engaged in. Over 120

people registered and we were pleased to host visitors from USA, New Zealand, France, Germany, The Netherlands and several other countries. Our guest speaker at the conference dinner (generously sponsored by AG Thames) was Professor Sir John Beddington, who has recently stood down as the UK Government's Chief Scientific Advisor, who gave a challenging speech about the need for horticultural research in the face of the increasing world demand for food. A feature of the conference, commented on by many, was the relatively young age of the participants and their obvious enthusiasm for what they were doing; all of this bodes well for the future.

So, in 2014 we start on the next century with confidence. We're going to formally conclude the centenary celebrations and look forward to the next 100 years, at the Amos Lecture on 27 February when I will give a lecture on "The scope of scientific research in fruit growing" - the same title that Dr Dunstan, Principal of Wye College, spoke to when he met with a group of fruit growers at Maidstone Town Hall in late 1912 to launch the idea of a fruit research centre in Kent. We have come a long way since that first lecture but the needs of the industry are ever-changing and I am confident that our research activity at EMR is now responding as energetically as ever to those needs.

Prof Peter J. Gregory

Right: Prof. Sir John Beddington with Will Sibley at the Science Conference Dinner



Below: Visitors to the Science Conference and Open Day



NEWS

Native woodland biodiversity

Over the past 30 years, a considerable area of new native woodland has been planted under various farm woodland grant schemes. However, much of this woodland contributes relatively little to the biodiversity of the wider landscape. A number of now really scarce species like the willow tit depend on young woodland and can respond well to woodland management.

At a workshop organised by EMR in the heart of the National Forest, land owners/managers were shown the potential value of new native woodland and how such woodland can be improved and managed for wildlife, through the adoption of guidelines determined during a project funded by the Esmée Fairbairn Foundation. The project was led by East Malling Research and involved a consortium of partners including independent consultants Dr David Blakesley (Wildlife Landscapes) and Dr Peter Buckley. New native woods were selected as case studies. Aspects of their wildlife value were assessed, and management plans were produced to show how current practices could be modified to improve the value of the habitat for plants, birds, butterflies, reptiles,



amphibians and invertebrates, and to aid integration of the woodland into the landscape. Critical factors identified were:

- Management of woodland edges to enrich structural and shrub diversity
- Provision and management of rides and glades to increase the diversity of plants and insects
- Management of closed canopy areas to create a diversity of age structures.

A guide written by Drs Blakesley, Jean Fitzgerald (EMR) and Buckley (left) and published by EMR was given to all those who attended the workshop. It summarises the project results and offers practical advice on evaluation and management to benefit woodland owners/ managers, including conservation organisations and local authorities. By adopting the best practice suggestions set out in the guide, many owners and managers should be able to significantly increase biodiversity in new native woods and increase the connectivity of woodlands in the wider landscape. Copies of the guide are available from Chantelle Jay at EMR (chantelle.jay@emr.ac.uk; 01732 843833) or to download from the EMR website at www.emr.ac.uk

Chantelle Jay

The project was supported by Butterfly Conservation, EMR, Forestry Commission England, High Weald Joint Advisory Committee, Millennium Seed Bank Partnership Kew, The National Forest, RSPB, Bearsted Woodland Trust, The Woodland Trust, Wildlife Landscapes, the Royal Society of Wildlife Trusts, the People's Postcode Lottery, and also funded by the Esmée Fairbairn Foundation.



Dr Roger Carline

Roger started his employment in November, in the role of Managing Director of East Malling Services, the commercial arm of EMR.

Roger will focus on increasing commercial revenues and engagement through exploitation of EMR intellectual property and capability.

Originally an MoD Senior Research Scientist (RSRE/DERA), Roger moved to a business development and management role, upon privatisation to QinetiQ. He transferred to a Deputy Director role for DTI and the regions, supporting industry in the adoption of micro and nano-technologies in all sectors followed by time developing his own profitable consultancy business. As CEO of 'Eminate', a wholly owned University subsidiary, he achieved a turn-around in company fortunes, securing the company's future. Most recently Roger has focussed on multiple activities supporting commercialisation activity in UK HEIs. Roger remains a senior associate at the University of Liverpool.

Andrew Armitage

Andrew commenced employment at EMR in December, in the role of Bioinformatician.

Andrew will be undertaking genomics research on perennial fruit species and their pathogens and pests. Much of this research



will be to investigate the molecular mechanisms involved in host resistance to pathogens and pests and the generation of web-based bioinformatics resources for a wider user community. Andrew is completing his PhD in population genetics on 'Alternaria leafspot pathogens: genetics, evolutionary history and diagnostics' from the University of Warwick and holds an MRes in Biology and BSc in Ecology from Cardiff University.

Dr Emma Tilston

Emma commenced employment at EMR in November in the role of Soil/Rhizosphere Scientist. Emma will progress EMR's scientific understanding of the interactions between roots and soils and substrates used in commercial horticultural practice.

Emma holds a BSc (first class) and PhD in Biological Sciences from the University of Exeter.

Emma has most recently worked as an Agricultural Modeller at Scotland's Rural College. Prior to that, she held a Post-doctoral Research Associate post at the Scottish Universities Environmental Research Centre. Emma has also worked at the University of Reading as a Research Fellow in Environmental Chemistry and Laboratory Manager, a Post-Doctoral Research Associate at the Swedish University of Agricultural Sciences and she held the same position at the University of Stirling.



Seminar Series

Once again, EMR has been successful in attracting a number of high profile speakers from top research institutes across the UK and from Germany and Australia, to speak at EMR's new seminar series. Members are invited to attend and a full list of speakers and topics will be available on EMR's website. Recordings from the 2013 series are available on CD from the EMR Communications team.



Diary Dates 2014

- 27 Feb.** Amos Memorial Lecture at EMR. Prof. Peter J Gregory "The scope of scientific research in fruit growing"
- 27 Mar.** EMRA/MFSS Storage Day
- 24 Apr.** EMRA/HDC Tree Fruit and Cherry day
- 23 Jul.** Fruit Focus
- 21 Sep.** Bradbourne House Open Day
- 20 Nov.** EMRA/HDC Soft Fruit Day

AWARDS & VISITS

Long Service Awards

Karen Lower (25 years)

Karen began as an Assistant Scientific Officer in 1988. She currently holds the role of Research Assistant in the Pest and pathogen ecology for crop management programme.

Andy Passey (40 years)

Since he started work at East Malling in 1973, Andy has amassed vast experience in research covering a wide range of techniques and skills within the fields of plant biotechnology within



Adrian Padfield (Trust), Bill Leaney, Andy Passey and Peter Gregory (L-R)

Dr David James' group, and more latterly in conventional plant breeding. He currently holds the role of Assistant Strawberry Breeder.

Roger Payne (40 years)

Roger started work in December 1969 as Experimental Worker. Roger is particularly known for his expertise in setting up experimental irrigation systems and detailed knowledge of the range of equipment used within the glasshouse area. He now holds the post of Glasshouse Maintenance Specialist.

Bill Leaney (50 years)

Bill arrived at East Malling in 1963 at the tender age of 15 at a time when there were still working horses on site. Bill has performed most tasks on the farm from working in the nursery fields to spraying and more recently, to arable cultivation and ploughing and now carries the title of Tractor Driver/General Farm Worker



French Gala growers and Barming School among the visitors to EMR



For further information, please contact:
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