



# RHS RHS Science Strategy Update 2021





# The RHS Vision

To enrich everyone's life through plants, and make the UK a greener and more beautiful place.



Theme  
**1**  
Garden Plant  
Diversity



Theme  
**2**  
Plant Health



Theme  
**3**  
Environmental  
Gardening for  
Wellbeing



# Introduction

In spite of it continuing to be affected by the Covid-19 pandemic, 2021 was a momentous year for RHS Science.

The opening of Hilltop – The Home of Gardening Science at RHS Garden Wisley, and the completion of the RHS Science & Collections team's move to their new home, was a major event in the scientific world. It represents a new beginning for UK scientific research: a place that is a focus for gardening science to tackle the climate and biodiversity crises that in turn affect the health and wellbeing of the nation. Promoting the sheer joy of gardening is just as important: the work of RHS Science & Collections at Hilltop helps everyone to grow as well as they can – and enjoy the many benefits plants and gardens bring, so we can fulfil the RHS Vision of enriching everyone's life through plants.

RHS Hilltop has brought together our laboratories, research facilities, herbarium, entomology collections, library, education spaces and three associated gardens to put science and learning at the heart of the RHS. It has become a fitting home to help us work towards our horticultural science objectives. In June 2021 we started welcoming visitors to the centre, allowing us to make the results and breadth of our work even more visible and shared more widely.

Our Collections are now in one place, housed in the right environments for preserving and expanding them for current and future generations to use and share. The Herbarium is more accessible than ever, and work continues towards our ambition that all plants cultivated in UK gardens are included in this collection.

The state-of-the-art facilities at Hilltop enables us to continue to strengthen our links with universities and other institutions; we have increased the number of PhD students and Fellowships we support. We have used our research and knowledge to advise and influence the government and support the horticultural industry. For example, our expertise has been sought as we work towards our goal of being peat-free by 2025 and in addressing the climate and biodiversity crises via the new RHS Sustainability Strategy.

The achievements outlined in this document reflect the highlights of the team's work towards the *RHS Science Strategy 2020–2025*, despite the continuing pandemic restrictions. All we do helps address wider concerns yet at its heart is our vision to promote and share the joy of gardening and plants, and improve the wellbeing and health of all.



**Professor Alistair Griffiths**  
RHS Director of Science & Collections

## The RHS Sustainability Strategy

Launched in 2021, this major new initiative aims to make the RHS net positive for nature and for people, and encourage others to do the same. Through the strategy we want to:

- **Optimise** cultivated plant genetic resources in gardens to
- **Maximise** plant and environmental health benefits and the joy of gardening, while we
- **Minimise** resource use and waste

and share the results with the government, other institutions, the horticultural industry and gardeners.



The RHS would like to thank everyone who has given so generously to develop and complete RHS Hilltop, including our members and visitors. The RHS would particularly like to thank The National Lottery Heritage Fund, The Mohn Westlake Foundation, Enterprise M3 Local Enterprise Partnership, Oak Foundation, and The Royal Commission for the Exhibition of 1851.





# Horticulture Matters

## RHS Hilltop

The Home of Gardening Science opened in June 2021, providing state-of-the-art facilities that enable the RHS to inspire and train the next generation of horticultural scientists. The new centre, and its three associated gardens, is the only place in the world dedicated to gardening science. It will allow the RHS to support an increasing number of collaborative PhDs and Post-doctoral Fellowships (currently 18 PhDs and three Fellowships, with ambitions to increase that number) to carry out research that will help all gardeners grow and protect the environment. RHS staff, students and apprentices will also benefit.



## PhDs supported by the RHS in 2021 (and the University partner)

Benign enhancement of natural defences (University of Sheffield / James Hutton Institute)

Urban Buzz: quantifying and enhancing the resources available to pollinators in urban landscapes (University of Bristol)

Garden Gastropods: slug and snail diversity in UK gardens (University of Newcastle)

Exploring and improving the efficacy of *Phasmarhabditis hermaphrodita* as a biological control agent for slugs (Liverpool John Moores University)

Assessing the risk of viruses from niche tuber crops of Andean origin (University of Newcastle)

Novel approaches to control plant pathogenic pseudomonads (University of the West of England)

Do beneficial insects such as pollinators spread aphid-lethal dicistroviruses? (University of Cambridge)

Native and invasive ladybirds in a changing UK climate (University of East Anglia / CEH)

The dynamics of insect biodiversity in novel British landscapes (University of York)

Use of endophytes to induce honey fungus resistance (University of Bristol)

Maximising the environmental benefits of gardens through optimal planting choices and understanding of occupants' engagement (University of Reading)

The impact of plants on the design of healthy office environments (University of Reading)

The wellbeing garden: examining design features and sensory experiences to inform garden design (University of Surrey)

Can urban air quality be improved through the use of plant-associated bacteria? (University of Warwick)

*Narcissus* phyloclimatic modelling (University of Reading)

Evolution of the Mediterranean flora – squills, bluebells and grape hyacinths (University of Reading)

The impact of climate change on UK garden plants – can we avoid a new Japanese Knotweed? (University of Reading)

## Career success following RHS-supported studies or scientific work



▲ **Imogen Carey** studied for a BSc in Human and Physical Geography at the University of Reading. She had Tijana Blanusa as supervisor on her dissertation on how we use our gardens in the UK, focusing on the social and environmental benefits they bring, especially during the pandemic. Imogen also benefited from access to the most recent data and insights from research being undertaken on different garden plants. Currently Area Operations Lead for water production with Thames Water, Imogen is focusing on developing spaces for mental, physical and environmental wellbeing, including introducing appropriate plants.

▼ **Ioannis Chatzipetrou** worked as a Research Assistant in the Environmental Horticulture team, where he carried out several projects linking ornamental plant physiology with climate change. He also managed the Soil Advisory Service, and received guidance from Marc Redmile-Gordon, Tijana Blanusa and Paul McAleer – among others – in setting up, running and interpreting the results of trials. This experience, and the personal skill set he developed while at the RHS, has helped Ioannis in his new role as Potato Breeding Trials Manager for Cygnet PB in Cambridgeshire, testing new bred potato clones under both laboratory and field conditions.



► **Janet Manning** participated in the Knowledge Transfer Partnership (KTP) project on Garden Water Management (see p11). Her work encompassed compiling the water road map for Wisley, planning and delivering the mainszrains website and exhibit at Chelsea, the Hilltop water displays and more, working with Mark Gush and the Environmental Horticulture team. She also contributed to the water neutral target in the RHS Sustainability Strategy, and worked closely with Laura Scruby and the press office to share widely the knowledge gathered during the KTP. Janet is now a freelance horticultural consultant, working with the landscape industry in a sustainability role.



► **Paul McAleer** worked as Research Technician at Wisley, providing technician support to PhD and other students, helping with their training with tools and understanding of the controlled environments at the Field Research Facility. His current role is Plant Growth Technician at the University of Edinburgh, where he helps grow research plants for scientists, PhD, master and undergraduate students, while also providing technical advice on the selection of growing media, watering and settings for controlled environment areas.



Horticulture Matters continues to address the skills shortage in the horticulture industry. The RHS recognises the need to develop research skills in horticultural science; RHS Science supports a number of post-graduate research projects in collaboration with universities across the UK and abroad.



# 1 Garden Plant Diversity: optimising the genetic potential of garden plants

- Optimise and realise the genetic potential of ornamental horticultural crops to benefit the environment and human health
- Understand and promote the benefits, use and conservation of plant genetic resources in UK gardens
- Provide a single, authoritative source for the naming and classification of UK-cultivated plants
- Improve identification and description of garden plants for RHS members, RHS Gardens, RHS Flower Shows and RHS Plant Trials

## Sander's List updated again

As International Cultivation Registration Authority for orchid hybrids, more than 3,000 orchid grexes (hybrids) are registered each year, and published every three years in an Addendum to *Sander's List of Orchid Hybrids*. Most registration is done online. In 2021, the 14th Addendum included 11,000 new grex names and 86 new hybrid genera.

## Amaryllis belladonna plastome published

Molecular studies have shown *Amaryllis belladonna*, part of the Amaryllidaceae family along with *Narcissus* and many other genera, is a sister to the rest of the family. Sequencing the complete plastome is vital to the study of the evolution of the family, particularly dating the evolution of daffodils. In turn this will help explain the readiness with which daffodils hybridise and the huge range of cultivars arising that are available to gardeners.



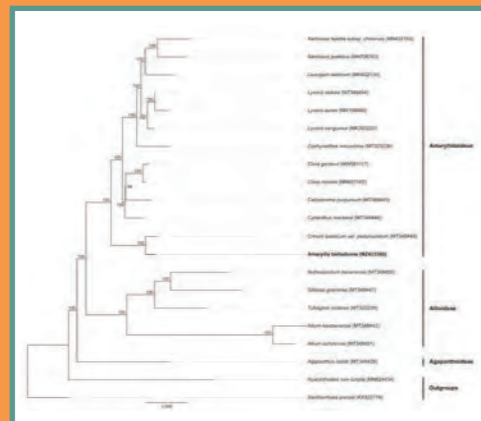
## New Lathyrus monograph published

These in-depth guides are produced to increase awareness of the diversity and range of a garden-plant genus. This new book covers *Lathyrus* species, to encourage a wider variation to be grown by gardeners and the horticulture sector. It covers 150 species – including sweet peas and the garden pea – and provides descriptions and illustrations of 527 of the better-known cultivars.



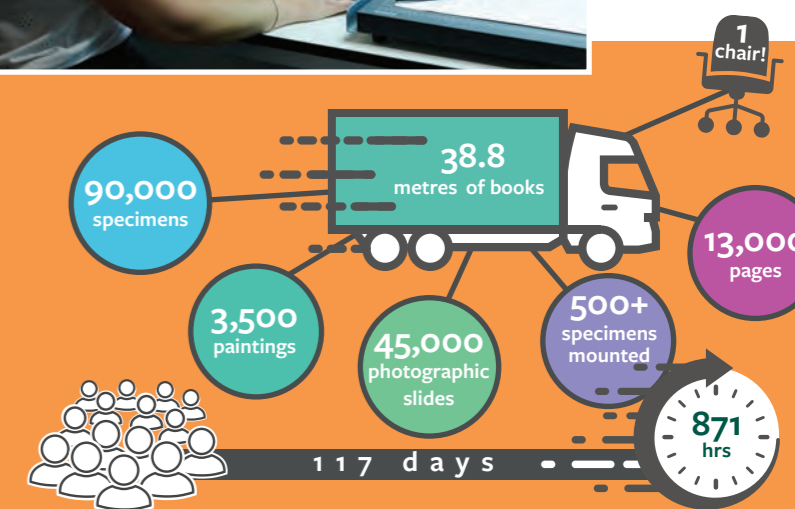
## Herbarium volunteers visible

Visitors to the Atrium at Hilltop can see Herbarium mounting volunteers at their painstaking work, carefully preparing specimens to be added to the collections. Five collecting and 10 mounting volunteers were recruited for the new, purpose-built RHS Herbarium, to collect and document all the UK's garden plants. The existing 90,000 specimens could be increased by 310,000 additions by 2050.



## Our new 1851 Royal Commission Herbarium

In February 2021 we completed our move, having frozen 90,000 specimens, transported 3,500 paintings, 45,000 photographic slides and prints, 13,000 pages of collectors' notes and 38.8 metres of books. We welcomed 15 new volunteers who clocked up an impressive 117 days or 871 hours, and mounted and collected over 500 specimens. Our collection records were moved from BG-Base to BRAHMS.





# 2 Plant Health: healthy plants, gardens and wildlife



- Monitor plant pests and diseases in gardens
- Improve detection and identification of plant pests and diseases
- Advance control and management strategies for plant pests, diseases and weeds in gardens, while working towards minimising pesticide use in gardens
- Encourage good stewardship of nature in gardens for environmental benefit



## Hope against honey fungus

To find new sustainable controls for deadly honey fungus root rot, RHS scientists studied roots of susceptible plants that grew near disease outbreaks, but did not become infected. Isolates of the fungus *Trichoderma* were collected and screened, revealing that two isolates of *T. atrobrunneum* prevented the disease. Further work will aim to produce nursery stock infused with these beneficial fungi, plants which could survive in honey fungus-infected soils.

## Wildlife gardening gateway

Since its launch in March 2021, a new online wildlife gardening gateway on the RHS website – rhs.org.uk/wildlife – has around 15,000 views. The new site equips gardeners with the know-how to become good stewards of nature, is accessible and brings this information into one place. It encourages gardeners to create new habitats, offers inspirational plants to grow, and explains the wildlife you can find in a garden, and more. Maximising our gardens for wildlife brings environmental rewards, including supporting pollinators, reducing use of pesticides and improving health and wellbeing.

## Biosecurity policies to protect the RHS and UK horticulture

The bacterium *Xylella fastidiosa* is one of the biggest risks to the UK horticulture industry and the wider landscape. Starting with RHS Chelsea Flower Show 2022, an updated *Xylella* policy will be implemented, aimed at reducing the risk of *Xylella* entering the UK. Nine plant species considered to be high-risk hosts for *Xylella* were required to have been growing in the UK for 12 months before being used at an RHS Show. Now, importation of finished plants as the main route to the UK market, such as olive and oleander, will be excluded from RHS Shows.

## Citizens continue to count slugs

Slugs currently head the RHS list of top complained-about garden residents, so understanding which species are causing problems in gardens and are most abundant is a research priority. From October 2020 to October 2021, gardeners across the UK took part in monthly Slugs Count project surveys of their gardens. More than 21,000 slugs were collected and species identified; non-native species are becoming more dominant, which may be driven by climate change and highlights the importance of biosecurity to help prevent further species arriving.



**Wildlife gardening**

Sharing our gardens with nature brings joy to an increasing number of gardeners. A rich diversity of plant and animal species will live happily alongside people, needing only a little helping hand from us. Discover what you can do to make your outside space a haven for wildlife

**Top things to do**

- 1 Encourage garden birds and provide shelter
- 2 Let a patch of lawn grow long
- 3 Make a wildlife pond
- 4 Plant a flowering tree or berry-bearing shrub
- 5 Sow a pot or border with nectar-rich annuals



**Wildlife gardening FAQs**  
Your top questions about gardening for wildlife answered...



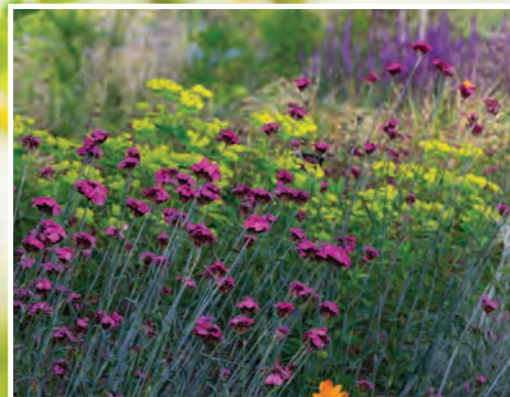
## Plant health priority at Bridgewater

In planning for the RHS Garden that opened in May 2021, every plant list was assessed for hosts of quarantine and regulated pests, influencing decisions on plant selection. Plant supply contracts were specifically written for the project. More than 400 trees were inspected; thousands of plants were monitored off-site before being allowed into RHS Garden Bridgewater to ensure the highest level of plant health.



# 3 Environmental Gardening for Wellbeing

- Advance the understanding of cultivated plants, gardens and gardening to adapt and mitigate against climate change and improve our environment
- Encourage sustainable resource use in gardens for environmental benefit
- Advance knowledge for growing food in domestic, community and school gardens to improve nutrition and wellbeing
- Better understand the role of plants, gardens and gardening in improving social, physical and mental wellbeing, for individuals and communities



## RHS Sustainability Strategy launched

A major initiative, the RHS Sustainability Strategy, was launched in September 2021 ([rhs.org.uk/about-the-rhs/sustainability](https://rhs.org.uk/about-the-rhs/sustainability)).

Addressing the climate and biodiversity crises and the threat from invasive species, the publication gives targets and action points for the RHS to become Net Positive for Nature and for People. Contributions towards the strategy were made by various scientists within the Environmental Horticulture team, and covered Net Positive for People and Net Positive for Nature Targets.

## Better use of water in the garden...

The three-year Knowledge Transfer Partnership (KTP) project on Garden Water Management was completed in November 2021. It addressed the risks associated with the dependence of ornamental horticulture on water, promoted the role of water in sustainable gardening, and suggested approaches to build resilience to climate changes. It reviewed information, best practices and innovative solutions to improve water management in gardens. The project gained widespread media coverage, including TV, the national press and social media. The [www.mains2rains.uk](https://www.mains2rains.uk) website was developed to drive behavioural change in water management in gardens.

By the end of the project more than 900 gardeners had committed to an annual saving of over 11 million litres of mains water. RHS water-related webpages were accessed 1.6 million times during the project; visits to watering advice increasing by 142%, and a water policy was developed for the RHS.

## ...is award winning

Knowledge Transfer Partnerships awarded their Certificate of Excellence to the completed project, judging it 'Outstanding' – its highest award – for its achievement in meeting its KTP objectives.

## Tree traits trial

In order to be able to advise gardeners on the best tree cultivars to help capture carbon, prevent flooding or cool urban areas, 60 trees were planted at Wisley's Field Research Facility in a trial of tree traits for ecosystem services. The first full growing season of measurements of sap flow, biomass and soil moisture has been concluded.



## The Wellbeing Garden – one of Hilltop's living labs

Three gardens that surround Hilltop were opened in June 2021. The Wellbeing Garden, created by Matt Keightley and the RHS Science and horticultural team, is designed to test the emotional and physical responses of the garden's visitors. A series of garden rooms for relaxation or contemplation provides an immersive journey; plantings of hot or cool colours, tactile grasses and scented plants provoke different responses. Sounds from the tinkling rill can energise or be therapeutic, and changes in level create rooms that enclose and calm. Visitors' responses will be recorded and this research used to show the link between gardens, plants and wellbeing, as well as influence advice given to those creating gardens in public spaces. This will inform the design for a new evidence-based Wellbeing Garden Blueprint by 2025.



More than 43.5 million online plants and advice views



# The Global Knowledge Bank

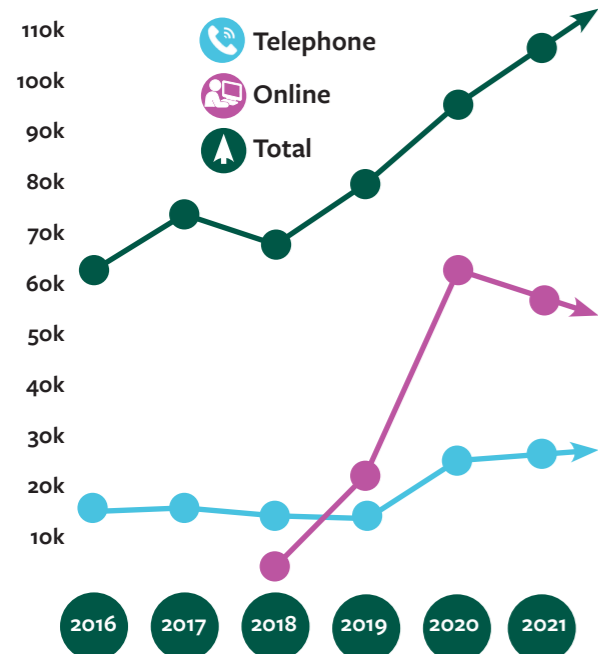
The RHS is a knowledge-based charity, which creates and shares its information and data through a range of channels to reach a wide audience that includes gardeners, academia, the government and the horticulture industry. It aims to help everyone to garden successfully and enjoy the process of growing.



## Return of face-to-face gardening advice



Members and visitors welcomed RHS Gardening Advisors back to RHS Shows and Gardens in summer 2021. Advice desks re-opened at Wisley, Hyde Hall, Rosemoor and Harlow Carr. A successful taster session at the opening of Bridgewater in May 2021 has paved the way for a new dedicated service to begin there in April 2022. More than 20,000 advice questions were answered at RHS Flower Shows in 2021.



## Hilltop Live brings science direct to visitors

The opening of RHS Hilltop – The Home of Gardening Science brought the opportunity to speak directly to visitors through a new, daily programme of talks named Hilltop Live. Since June 2021, more than 1,400 visitors benefitted from these sessions. Gardening Advisors talked about seasonal topics and provided a popular weekly panel discussion with a Q&A. Scientists took the opportunity to raise awareness of plant health and garden biosecurity as well as encouraging more sustainable gardening.

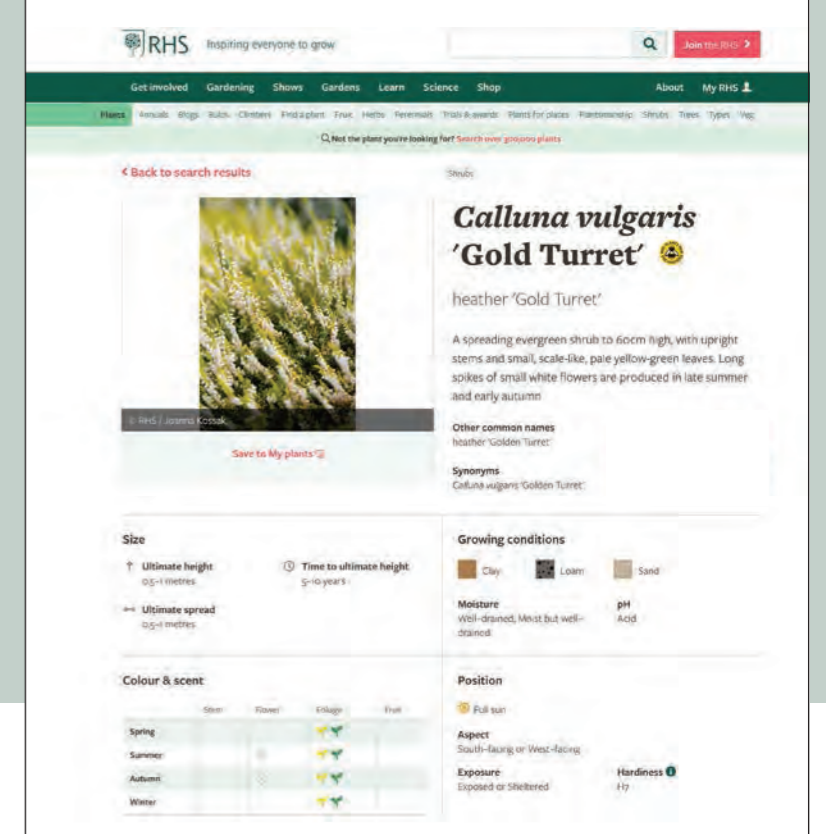
### Most popular Hilltop Live sessions

- |   |   |
|---|---|
| Mathew Rees<br><b>What's my plant?</b>                      | Marc Redmile-Gordon<br><b>Gardening for climate with Climate-Positive Gardening</b> |
| Hayley Jones<br><b>Marvellous Moths</b>                     | Horticultural Advice Team<br><b>Horticultural advice panel Q&amp;A</b>              |
| Lenka Cooke<br><b>Clematis Cultivation</b>                  | Hayley Jones<br><b>The Ins and Outs of Slugs and Snails</b>                         |
| Andy Salisbury<br><b>Invisible gardens: wildlife havens</b> | Anne Adam<br><b>Composting - making your own compost</b>                            |
| Nicola Barker<br><b>Semi ripe cuttings</b>                  |   |



## More plant profiles added

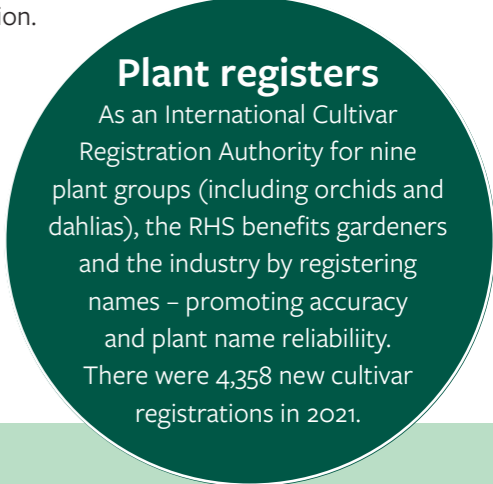
Since May 2021 more than 11,000 new plant profiles have been added through the Platinum Profiles project on rhs.org.uk, providing gardeners with detailed, accessible information on each plant and how to grow them. This ambitious project will double the number of plant profiles on the website and be completed in April 2022, having hugely improved access to attractively illustrated, quality information for gardeners across the UK.



## Data moved to new Horticultural Database

The complete collection of more than 100,000 herbarium records, plus 230,000 plant records for the RHS Gardens, has been moved to the new RHS Horticultural Database, completing the three-year Horticultural Database project

that makes this data more accessible. The project has been a collaboration between RHS Science & Collections, Curatorial, Digital and IT departments along with the BRAHMS team and Oxford University Innovation.



### Plant registers

As an International Cultivar Registration Authority for nine plant groups (including orchids and dahlias), the RHS benefits gardeners and the industry by registering names – promoting accuracy and plant name reliability. There were 4,358 new cultivar registrations in 2021.

## John MacLeod annual lecture

Held at Hilltop in 2021 for the first time, the annual John MacLeod lecture is a well-respected, keynote speech on significant horticultural issues.

In 2021, the lecture was delivered by guest speaker Professor Ian Holman from Cranfield Water Science Institute, who discussed in detail the challenge of water use in gardens. The talk has been made available on YouTube.

Previous lectures have included Dr Andrew Hiron on the environmental and health benefits of trees (2019), and Professor Nicola Spence, DEFRA's Chief Plant Health Officer, on protecting the UK from plant pests and diseases (2018).





# RHS Libraries



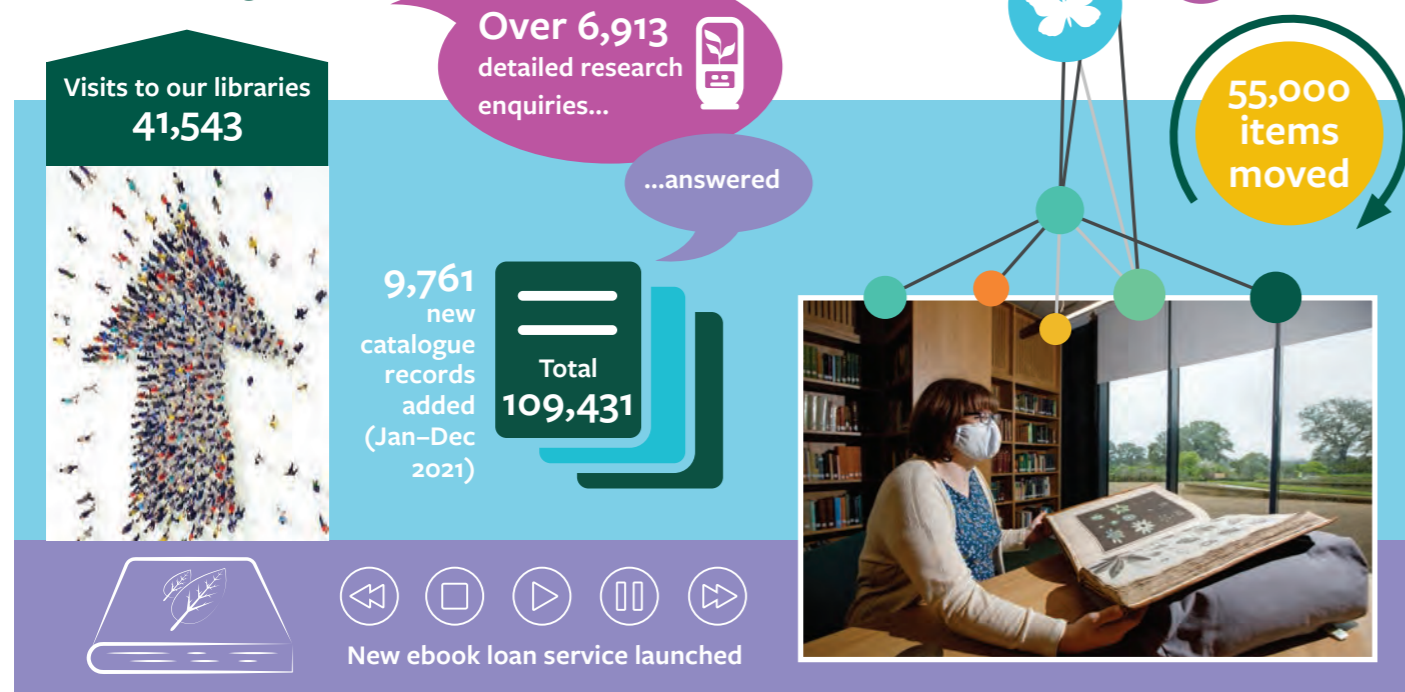
The RHS Library Service encompasses a range of collections of books and magazines covering all aspects of gardening, plus important historic garden reference materials and online resources. These are held at RHS Lindley Library in London and libraries at Wisley and Harlow Carr. RHS members can borrow books and magazines in person or use the online Libby portal to borrow ebooks and audiobooks.

## Moving into Hilltop

Full library services at Hilltop were re-launched in June 2021, after 55,000 items had been moved there. The new library, with its bespoke, state-of-the-art facilities, enabled the team to increase access to the collections and enhance the storage and long-term preservation of rare books and archives. Better access to the books and digital collections through these purpose-built facilities has helped engagement with visitors, members, staff, students and external researchers. Since opening, there have been more than 41,000 visits to the new library.



## RHS Libraries: the year in figures



## Storytelling success

Hilltop Library at Wisley has proved to be a great hit with young children. Of the events held in the new library, the most popular have been weekly storytime sessions. RHS Science has shown that the team can share the joy of gardening and plants with people of all ages.



## Popular art show extended

The RHS London Botanical Art and Photography Show was hosted for the first time at Saatchi Gallery in London, in September 2021. Works from 15 botanical artists and 19 photographers featured in a display of more than 200 pictures, curated by the Lindley Library's Art Curator and Botanical Art Judging Secretary, and the Photographic Competition Judging Secretary. Almost 10,000 visitors, including 844 RHS members, saw the exhibition; its success led the gallery to extend the show for an extra week.

## Gardens of Imagination

The Ruhleben Horticultural Society, a group of inmates in a First World War internment camp, were supported to garden by the RHS. Their archive papers formed a starting point for artist Faye Claridge for creative workshops at HMP Send to reflect on inmates' experiences of gardening in prison. The resulting artworks and interviews were shared in an online exhibition 'Plants, Prisons and Potential', created by the Library Team, and large-scale displays at the entrance to Hilltop.

## Online exhibitions

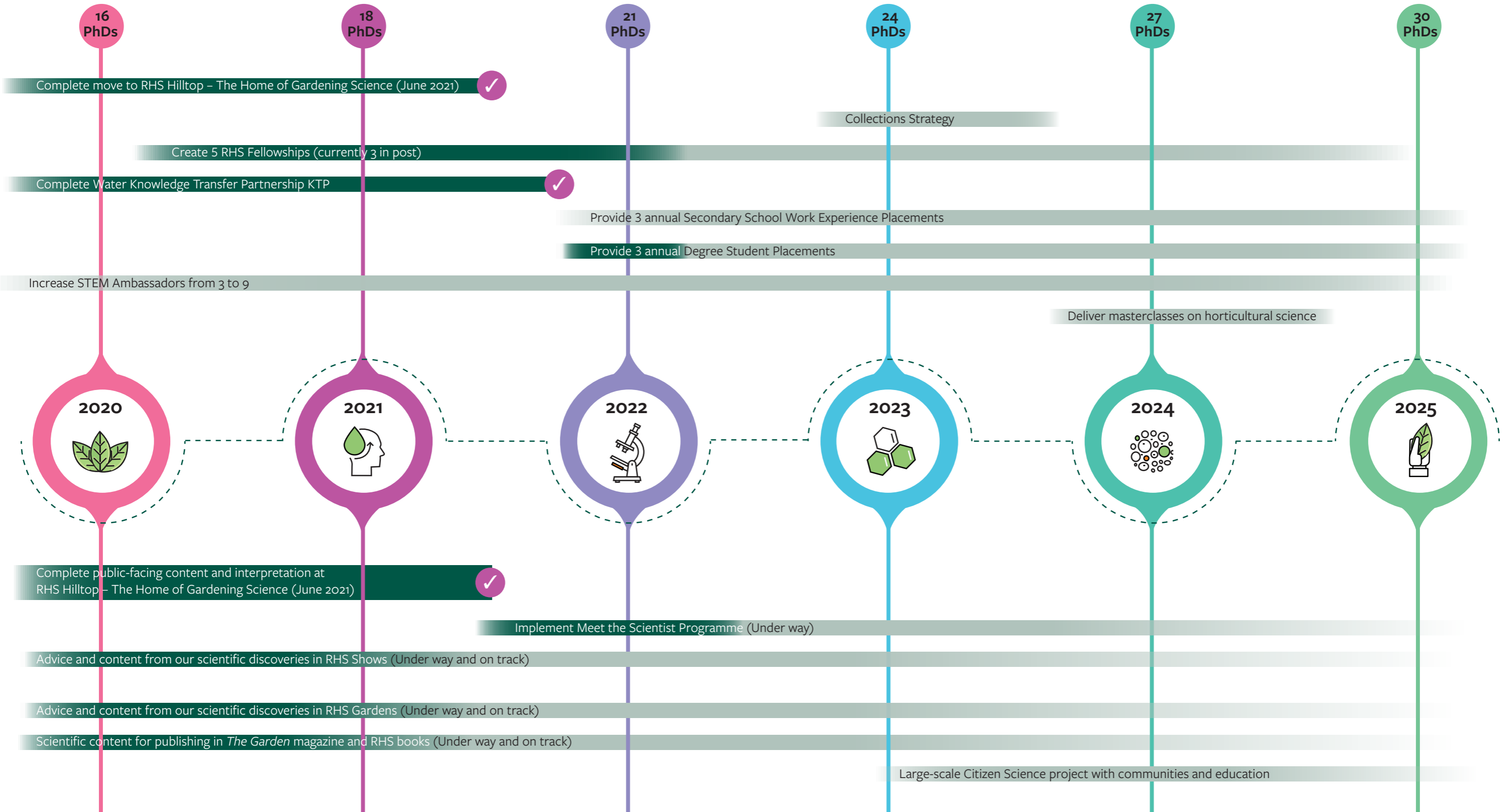
<p><b>Portrait from nature</b> The story of nature printing told through beautiful plant 'self-portraits' from the RHS Lindley Collections.</p>	<p><b>Constance Spry archive</b> Discover our rich collection of items relating to the pioneering flower designer and author Constance Spry.</p>
<p><b>Mr Wilson's Wisley</b> The story of the man who created the extraordinary experimental garden that became RHS Wisley.</p>	<p><b>A Host of Golden Daffodils</b> A history of one of our favourite springtime flowers through the collections of the RHS Lindley Library.</p>



# Timeline

## RHS Science Strategy Timeline from 2020

Increase PhD Projects





# Selected recent RHS Science publications

## Garden Plant Diversity

- ✿ Dennehy, Z., Bilsborrow, J., Culham, A., David, J. & Könyves, K. (2021) The complete plastome of *Amaryllis belladonna* L. (Amaryllidaceae). *Mitochondrial DNA Part B* 6:12, 3393–3395, DOI: 10.1080/23802359.2021.1997121
- ✿ Dennehy, Z., Bilsborrow, J., Könyves, K., David, J., & Culham, A. Dating Daffodils to save species. *Daffodil, Snowdrop & Tulip Yearbook 2021*
- ✿ Harvey, Y. & Paterson, L. Collecting with Zhao Chengzhang. *The Plant Review* 3(3): 40–43
- ✿ Könyves, K., Bilsborrow, J., Christodoulou, M.D., Culham, A., & David, J. (2021) Comparative plastomics of Amaryllidaceae: Inverted repeat expansion and the degradation of the *ndh* genes in *Strumaria truncata* Jacq. *PeerJ* 9:e12400 <https://doi.org/10.7717/peerj.12400>
- ✿ McDonald, S. Notes from the International Rhododendron Registrar 2020 *Rhododendrons, Camellias and Magnolias* 72: 185–189
- ✿ Shaw, J.M.H. (2021) *Arctotis* hybrids in cultivation. *The Plant Review* 3(3): 60–63
- ✿ Shaw, J.M.H. (2021) *Crassula sarcocaulis* Eckl. & Zeyrh. – variation and clones in cultivation. *Bradleya* 39: n246–252
- ✿ Shaw, J.M.H. (2021) *Iris × hollandica* (Iridaceae): a valid name for Dutch Iris. *British & Irish Botany* 3(2): 227–231

- ✿ Shaw, J.M.H. (2021) *Petrocosmea rotundifolia* – a new name for plants cultivated as *P. minor*. *Curtis's Botanical Magazine* 38(1): 115–125
- ✿ Shaw, J.M.H. (compiled by Sanford, R.J.) (2021) *Sander's List of Orchid Hybrids. 3 Year Addendum 2017–2019*. RHS: London.
- ✿ Shaw, J.M.H. (2021) The identity of *Oxalis megalorrhiza* – a 300-year puzzle. *Cactus World* 39(1): 67–72

## Plant Health

- ✿ Cromeey, M., et al. (2021) The rise, fall and resurrection of chemical-induced resistance agents. *Pest Management Science*. 77(9) 3900–3909
- ✿ Jones H. (2021) *Agapanthus* update – gall midge and eriophyid mite. *Journal and Proceedings of the Nerine & Amaryllid Society* 2021 part 2.
- ✿ Jones, H., et al. (2021) A method of culturing and breeding slugs through several generations *Journal of Molluscan Studies* 88(1).
- ✿ Newbery, J., Scrace, J., & Beal, L. (2021) Fungi on *Rudbeckia* in Gardens. *Field Mycology*. 22(2): 41–4
- ✿ Preston, C.D. & Newbery, F. (2021) White smut of *Cosmos* (*Entyloma cosmi*) *Field Mycology* 22(4): 131–133
- ✿ Rees, H., Drakulic, J., & Cromeey, M. Identification of native endophytic *Trichoderma* spp. for investigation of in vitro antagonism towards *Armillaria mellea* using synthetic and plant based substrates *Journal of Applied Microbiology*
- ✿ Tew, N., Memmot, J., Vaughn, I.P., Bird, S., Stone, G.N., Potts, S.G. & Baldock, K.C.R. (2021) Quantifying nectar production by flowering plants in urban and rural landscapes. *Journal of Ecology* 109(4): 1747–1757

## Environmental Gardening

- ✿ Blanus, T. (2021) How the humble hedge works hard to protect Britain's urban environment. *The Conversation UK*
- ✿ Chalmin-Pui, L. S., Griffiths, A., Roe, J. J., Heaton, T. Cameron, R.W. Why Garden? – Attitudes and the perceived health benefits of home gardening. *Cities* 112(2)
- ✿ Gush, M.B. (2021) Hydrological services of fruit trees in gardens and urban horticulture. *Acta Horticulturae*
- ✿ Larsen, E. (2021) The Benefits of our gardens. London Gardens Trust Blog <https://londonparksandgardens.wordpress.com>
- ✿ Manning, J. (2021) Janet's Water Management Advice. *The Garden March 2021* 146(4) 43–47
- ✿ Qadir, Z.J., Hadley, J., Breeze, T., & Blanus, T. (2021) Potential of urban roadside hedges for particulate matter removal – importance of species choice, and its economic impact. *Acta Horticulturae*
- ✿ Shen, Q., Redmile-Gordon, M., Song, J., Li, J., Zhang, K., Voroney, P., Xu, J., & Brookes, P. (2021) Amendment with biodiesel co-product modifies genes for N cycling (*nirK*, *nirS*, *nosZ*) and greenhouse gas emissions (N<sub>2</sub>O, CH<sub>4</sub>, CO<sub>2</sub>) from an acid soil. *Biology and Fertility of Soils*

## Horticultural Information

- ✿ Barker, N. How Bad is the Skills Shortage? *Horticulture Week* 10 Sept 2021
- ✿ RHS Plant Finder

**rhs.org.uk**

Royal Horticultural Society

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