



Promoting Excellence in Horticulture

Transcript for Session 1: 'Conservation & Education'

Speaker 1: Paul Smith

Good morning. It's a great pleasure to be here. And I'd like to thank the Royal Botanic Gardens, Edinburgh for the invitation to speak at this wonderful conference. We're going to kick off this morning session with a presentation here on the need for horticultural expertise in plant conservation. And look at some of the challenges and opportunities related to this. The context is well known to this audience, I'm sure: 20% of the world's plant species threatened with extinction. In fact, if you look at Kew's recent state of the world's plants report, it may be as high as 40%. The main driver for plant extinctions is land use change, particularly for agriculture, forestry, urbanisation, and so on. And the point here is that transformed landscapes have become the norm, man-managed landscapes, these will only increase as human populations increase.

What this means for all of those species that currently occupy or perhaps are clinging on in these transformed landscapes, is they face a series of challenges that are human related: not just clearing vegetation, but also things like over exploitation, pests and diseases, invasive alien species, and increasingly climate change. And this means that proactive conservation and management are needed. And this is really where horticultural skills come in and are so important. So why does this matter? Why is plant diversity important? Well, the reason is that we need plants to solve all of humanity's major challenges. Food Security, we need a wider range of crops to enable us to adapt. water scarcity, think of catchment forests need to plant trees that do not use water in dry areas, sustainable energy, biomass, biofuels, human health. Still, much of the world's population relies on traditional medicines, and that's based largely on plants and that pharmacopoeia. biodiversity loss itself. If you want to conserve a tiger or the Panda, these charismatic mammals, then of course, you need to conserve the habitats and the plants at the base of the trophic pyramid, or range of ecosystem services of course, water, erosion control, gas, exchange, oxygen, and so on. And both adaptation and mitigation of climate change. In short, plant diversity enables human innovation adaptation and resilience, and the more diversity we can conserve, the more options that we have in the future.

So what is the role of Botanic Gardens? Well, we grow at least 30% of all known higher plant species. And this puts us right at the top of the league when it comes to horticulture. You compare forestry or farmers, the crop sector and so on, they grow a very narrow range of plant genetic diversity. We grow plants right across the taxonomic array, we can find plants using herbarium records can identify them once we're in the field. We're increasingly conserving them in seed banks in our living collections, and in situ, a number of Botanic Gardens manage nature reserves. And increasingly, we're growing and managing diverse species assemblages in diverse landscapes. Botanic Gardens themselves are diverse landscapes for ecosystem services, including mental health, physical health, aesthetic value is an important ecosystem service. And we're restoring habitats and reintroducing plant species. As a sector, this is an increasing area of activity.

We would say there is no technological reason why any plant species should become extinct. With the array of techniques that we have. If we can get to species in time, then there's a very good chance that we can save them and prevent them from becoming extinct. This is a map of the world's Botanic Gardens from BGCI Garden search database, around 3000 of them that we have listed, and you'll immediately see a problem 85% of the world's Botanic Gardens are in the Northern Hemisphere. And very few Botanic Gardens are in the tropics where plant diversity is concentrated. So although we have 60,000 experts just within the BGCI network alone, and they're skewed towards the north, and one of our big challenges is how do we get that expertise and knowledge and share that with gardens in the south and particularly in the tropics to solve some of these species related problems. As an example, BGCI is leading the global tree assessment, which aims to assess the conservation



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status of all the world's 60,000 tree species by 2020. We're on track to do that. And already we know that there are other more rare tree species than there are common tree species. 58% of tree species are endemic to a single country, round a quarter are threatened with extinction. And we're assessing in situ and ex situ conservation effort. Today we have about three and a half thousand tree species that are critically endangered so about to become extinct and around 300 of those with fewer than 50 individuals remaining in the wild.

So if we have three and a half thousand critically endangered tree species, we have around 3000, Botanic Gardens and all of that those experts and surely this is something that we can tackle systematically. Some examples here are species that are on the brink of extinction are *Hyophorbe amaricaulis* in Mauritius This is the loneliest tree in the world. And in Curepipe Botanic Garden, this specimen is 150 years old as far as we know it's the only one it's diseased probably won't hang on much longer. But so far attempts to propagate it have failed. Some other examples here, *Acer amamiense* from Japan. This is Japan's only critically endangered maple again we need species recovery in place and horticultural expertise. and then this *Magnolia* from Mexico, one of a number of Central American *Magnolia* that we've not yet been able to propagate successfully.

Of course, there are many examples of successful species recovery, particularly where multidisciplinary approaches have been used. Perhaps the most famous is the *cafe marron* from Rodrigues on the left there, this was down to a single plant left in the wild. But over the last 30 years, particularly through horticultural effort. This has now been propagated and successfully reintroduced into Grande Montagne National Park in Rodrigues this picture taken just last year. On the right here is the *Mulanje cedar* Malawi's national tree. This was down to just seven individuals left within its native range on the Mulanje Mountain has been completely extirpated due to its value as a timber species, and BGCI and partners over the last few years have set up community nurseries around when Mulanje Mountain to propagate this species. And to date over 500,000 seedlings have been reintroduced back onto Mulanje Mountain. Many of you will know Dan Luscombe from Bedgebury. Dan came out to help to set up those nurseries and being a conifer specialist he was able to solve some of the problems related to the propagation of this tree.

Other examples here, golden camellia, *Camellia chrysantha*, here on the left from China and Vietnam. This is a species which was down to again just a handful of individuals. But working with local communities, it's now been propagated not just for reintroduction and recovery, but also to sell this very charismatic species to raise money and improve livelihoods in surrounding communities.

Karomia gigas is on the right from Tanzania down to about 12 individuals and completely gone from Kenya where it used to also occur. Again a useful timber street tree with a very straight bowl. This has now been propagated for the first time last year with Missouri Botanical Garden working with a Tanzania tree seed agency. And we're hopeful that we can help this species to recover Now that we know how to germinate the seed. So given that we have all of these plants species in trouble, and we have a really large pool of horticultural expertise, what are the impediments to deploying that expertise?

I think quite often information on which species need help and where they are is not broadly available. I'd say their institutional issues: horticulturists are often not plugged into plant conservation programmes within their own institutions. You could argue that that's generally within science. There's also a question of priorities: botanic gardens are not always willing to deploy the horticulture horticultural expertise due to competing commitments, particularly bringing in visitors, ornamental horticulture and so on. And on the other side, conservation practitioners don't necessarily know where to find specialist horticultural expertise. For example, in Mauritius, they're not able to cultivate *Badula* which is a genus in the family *Rhamnaceae*. And when I was out there a couple of years ago, they were saying Do you know any *Rhamnaceae* specialists, you can come and help us with the cultivation of these species and multiplying them up for reintroduction. And then of course, more prosaically I guess funding for travelling staff time is often not available, institutions might be willing to let their horticulturalist go and participate if there's no no money for travel. And that's the end of it.



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So what can we do at BGCI to help with this, this situation, and one of the things that we're doing is to set up these global conservation consortia. And this is particularly for groups of species where there might be particular problems associated with seed banking, for example, or setting up genetically diverse living collections, reintroduction, the kind of skills that are needed for that. And so far, we have four of these we have Magnolia which is led by Atlanta Botanical Garden, we have oaks led by Morton Arboretum, the global conservation consortium of Rhododendron led by the Royal Botanic Gardens, Edinburgh, and then maples, Acer led by the University of British Columbia. Now, the idea is that these are consortium not only have gardens in the north that might have expertise, but also gardens in the centres of diversity for the species, and the approaches integrated conservation, building up genetically diverse living collections, but using those for reintroduction and species recovery in the wild.

So when it comes to information about the species themselves, where they are, and which ones need a particular attention, the tool that we're currently developing, we should be ready actually, by the end of this year, is BGCI tree conservation portal and tracker. This is using global tree assessment data to set up a kind of a synthesis at the country level. So it will have national checklists like checklists of endemic species and of threatened species. But it will also be looking at this the species themselves to see which ones are ex situ conservation, which ones are in protected in situ. And for critically endangered tree species, who is working on them in real time, we will collect information, say this is under a conservation programme and this organisation is running it. And what this will enable us to do is to spot the gaps there, where do we have critically endangered tree species that are not protected ex situ, that are not protected in situ. And as far as we know, nobody's working on them. This will enable us to divert our resources where they're needed the most.

So if we know where the problem species are, where we need to direct our efforts, how do we find the expertise. And this is a new tool which BCCI has developed, it's online at the moment, and I would encourage you to sign up to it. It's a directory of expertise, which which currently includes 11 different disciplines, including conservation, horticulture, ecological restoration, and a number of other disciplines that are related to species recovery. And the idea is that this is a platform with which we can share the skills within our network with broader society, particularly with the wider conservation community. So if they need to find that rhamnaceae expert, they have a tool to do so they can search using taxonomy or geographical area of expertise and so on to find their particular expert.

And then finally, looking at term resources, particularly funding BGCI working with Morton Arboretum and Arbnet have set up this global Botanic Garden fund, and partnership Fund, which is a small grants programme, aimed specifically at helping people to work together, particularly on species recovery. And this year, we will have made 40 different grants out there, two and a half thousand dollars is the top amount. But that's enough to cover travel, exchange visits, and so on, really to get these collaborations going. And I would encourage you to use this and apply for this kind of funding. So BGCI can create these tools that will match the right expert with the right species. But ultimately, it's going to be down to institutions to decide whether they want to get involved and where they want to get involved. And this might mean making difficult choices.

You know, do you use your horticulture expertise to grow an interesting array of plant species within the garden and bring in visitors? Or do you deploy them out there working in in the wild with with partners in sensitive diversity? I don't think this is black and white, or in this case, red and green, I think it's possible to do both. But nevertheless, institutions will need to decide that they want to get involved. And for me, the choice is actually quite stark in the long term. We can either become museums of curiosity that show a wide range of plant species that are now extinct in the wild, and the only place you can see them is in a Botanic Garden. Or we can be part of the solution to the biodiversity crisis. I hope it's the latter. But what that means is working with partners in biodiversity hotspots, offering our training, mentorship and skills, deploying our resources where they're most needed. And most of all, making sure that in situ conservation is a priority. Too often collection expeditions and so on have been about bolstering our collections within our institutions. We need to change that emphasis and work on the



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recovery of these species in the wild. So I hope you will get involved. And if you're interested in getting involved, please sign up to our directory of expertise or get in touch.

Speaker 2: Natasha de Vere

Hello, I'm Dr. Natasha de Vere from the National Botanic Garden of Wales. I'm going to be telling you a little bit about our projects, increasing the health and well being of people, biodiversity and environment. The National Botanic Gardens Wales is dedicated to the research and conservation of biodiversity, sustainability, lifelong learning and enjoyment of our visitors. Hopefully many of you will have visited but for those that haven't, we are a very big site we have over 500 acres. Our plant collection includes the great glass house which includes plants from Mediterranean regions of the world. We have a Japanese garden, the systematics garden and welsh natives garden. And we're very lucky to be set within a rural landscape. The formal Botanic Garden is next to and located within Waun Las national nature reserve. This is managed as an organic farm showing the links between biodiversity and regenerative agriculture.

Over the last months, we've been developing our new conservation and research strategy for the next decade. This is very much based on the UN Sustainable Development Goals. And within a national context within Wales, we have the well being of future generations act. And our strategy fits in to the goals which are set within that legislation. Within our conservation and research work, we have a number of themes, saving plants and fungi, saving pollinators, international conservation and research and science and society and I'm going to tell you a little bit more about saving plants and fungi, saving pollinators, and science and society. Our work on saving plants and fungi is working with some of Wales's most threatened plant and fungi species. Much of the work that we do involves taking an evidence based approach. What research can we do which would help to conserve the plants of Wales to really understand what we need to do in order to make a difference? We also do lots of very practical horticulture focus conservation activities. So for example, we work on *Salvia pratensis* Meadow Clary, which has become extinct in the wild in Wales, a horticulture team grew many hundreds of plants along with Treborth Botanic Garden and Bristol zoo, and those plants reintroduced back into the wild.

We've also recently set up our National Seed Bank of Wales, we aim to conserve to begin with some of the Wales is most threatened plant and fungi species. But as we go on, we hope to collect all of the threatened plants, and then all of the native plants of Wales within our seed bank, as well as providing a way of safeguarding those seeds for the long term. We also hope to use the seed bank and in a much more immediate way. So we want to be able to look at the seeds that we have, and use those in conservation projects straight away. We're particularly interested in grassland restoration. And one of the projects which we've been involved with for many years is DNA barcoding. So the National Botanic Garden led the project that made Wales the first nation in the world to DNA barcode, all of their native flowering plants. And since then, we've been working with Edinburgh botanic garden to DNA barcode, the rest of the UK flora, and that project is nearly coming to an end. And we use our DNA barcoding work for a whole range of different applications. We work on the development of methods, we work on particular groups of species, and we also use our DNA barcoding in order to understand the role of pollinators and the plants which pollinators use. We've also done work with Bangor University, which is looking at airborne pollen in the atmosphere and how that relates to asthma and hay fever sufferers.

But one of the major areas of work they want to talk a little bit more about is our work on saving pollinators. pollinators really need our help, habitat loss, climate change pests and diseases, insecticides. All of these have created a perfect storm which has caused declines in wild pollinators, and it'll help in honeybees.

And we've taken a multi disciplinary approach to the work that we do in this area at the Botanic Garden. So we do research on what plants pollinators visit, we look at gardening for pollinators, how to identify pollinators and beekeeping. We do public



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engagement and pollinator events. We're developing seed mixes and a saving pollinators assurance scheme, which I'm going to tell you a little bit more about.

So in terms of the research that we do, we answer what sounds like quite a simple question, which plants do pollinators visit. And we do this by tracking the pollen which insects have on their bodies, which were record of the different plants they visited. We could do this by tracking as pollinators fly and looking what plants they land on. But you can't watch them all the time. And often you miss it, they're up in the trees, or they're somewhere where you can't easily observe them. But by looking at the pollen on their bodies, that's a way of having a record of what those different pollinators have been doing. So we retrieve that pollen from the bodies of pollinators or from samples of honey. And we extract the DNA from that column and DNA barcode it and compare it to our reference library to find out what the pollinators have been visiting. And we use that for a whole range of different applications with different pollinator groups. So for example, a piece of PhD research done by Andrew Lucas looked at hoverflies and he looked at hoverflies in agricultural grassland, and did really detailed fieldwork of what hoverflies were present in in different community types, but also looked at what pollen they were carrying on their body to look at the interactions with their environment. We do a lot of work within the Botanic Garden and use that as a study site for looking at the role of gardens and urban and amenity areas to pollinators. For example, the work being done by Abby Lowe here is she's looking at what plants, wild pollinators use within a garden setting on a month by month basis. So she collects pollinators each month, I looked at the pollen on their bodies, and looks at things like is there a preference for native or non native plants? How does the floral resource change throughout the year? What can we do to improve that within our gardens? And then Lucy Witter. Her research is developing seed mixes. So we have plots inside the Botanic Garden. So this is right within the middle of the public area of the garden. They're absolutely beautiful. And Lucy has been testing. First of all, a number of commercial seed mixes to see which one's the best for pollinating insects. She's then developed her own seed mix based on the literature to see if she can make her an annual meadow mix which is actually better for pollinating insects, as well as wild pollinators.

We do lots of work on honeybees, and we're developing the Honeybee Centre for research, training and engagement on honeybees and beekeeping. The type of research we do is similar, we look at what plants honeybees use throughout the year, again, using our DNA barcoding research. So for example, this is work done by Dr. Laura Jones. Within the Botanic Garden we can track what our honeybees do throughout the year. And actually even though we're within the Botanic Garden, the favourite plant for honeybees, which is shown in this graph, in the red colour is brambles *Rubus fruticosus*, closely followed by white clover *Trifolium repens*, but the garden plants also seem to supplement these major plants which are often native species.

Laura also looked at what honey bees do on a UK wide basis. We wanted beekeepers to send us samples of honey from their hives. So we went on the Gardeners World programme and asked people to send us samples. we analysed over 400 different honey samples, mostly from England and Wales. And what we looked at is how the honey which was being sampled now compared to what plants honeybees were using in 1952 by comparing to another data set. And what we found is that the honeybees basically tracked changes in agriculture over time, we saw that white clover is used a lot less by the honeybees, it's a lot less prevalent now within pastures and the wider landscape. Instead honeybees use *Rubus fruticosus* Bramble much more than they used to do in the 1950s

We've also seen the increase in things like oilseed rape Brassica species, this was not grown very much as a crop in the 1950s. But by the 1970s, it was grown much more abundantly. And it's a major plant now for honeybees. Finally, we see a significant increase in Himalayan balsam *Impatiens glandulifera*, and this shows how an invasive species can increase and then starts to become used as a natural resource. And of course, we have honey. So we produce our own honey at the Botanic Garden, which is for sale. But we also have our own range of soaps and cosmetics, which are all made by our beekeeper, Linda Christie.



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We offer training in beekeeping but also how to make lip balm and how to make wax flowers, or different types of things just to try and engage people as widely as possible with the world of honeybees.

So all of this research and engagement that we do, has been brought together into a scheme which we've recently launched, called the saving pollinators assurance scheme. Because what we found is, first of all, many of the labels that you see on garden centres in plants at the moment to which say that a plant is good for pollinators, aren't based on scientific research. So we wanted to be able to use our research in a very direct way in order to provide advice. But we are increasingly concerned about the fact that a gardener will go to a garden centre by a plant, which they think is going to help pollinators, but it's grown in peat compost. So we all know the fact of the destruction of peat, both as wildlife habitat but also the release of carbon, and its effect on the climate crisis. So we don't feel that plant grown in peat is ever going to be good for pollinators. There is also an issue that we don't really know if a plant has been treated with synthetic insecticides. So it would be very possible to go to a garden centre and buy a plant, which maybe not that good for pollinators, is grown in peat, and it's covered in pesticides. And it has a logo on saying that it's pollinator friendly. So our assurance scheme uses our research to find out what's really the best plants for pollinators and then we work with growers who actually are committed to growing plants without the use of peat and synthetic insecticides. And so our logo which is shown here, is actually a mark of assurance that those plants really should hopefully be good for pollinators in the garden.

And the idea of the importance of plants and gardens for health and well being has been something that during the coronavirus pandemic we've really seen during lockdown, we really saw the importance of people being able to go out into the natural world into their gardens, and to be able to connect with nature. And we know that there is a good research and policy background from that. We know that there is good evidence that being with within nature, working with plants, having and doing gardening can help our physical and mental health and well being. So we have two projects that work on this at Botanic Garden: our Growing the Future project is a five year project. We're just over halfway through, which uses gardens and gardening to prove the health of well being, health and well being of people, wildlife and the environment. So to give you an idea of what we've achieved so far, we've developed 378 training courses, we've held over 285 events, and over 6600 training days, we've trained over 15,000 people, and we've had almost 76,000 public engagements. We offer courses both at the Botanic Garden but also at hub sites throughout Wales. from things like practical horticulture to the science of horticulture to arts and crafts.

The events we run again, just try to engage people in as many ways as possible with plants, gardens and the natural world. And our other project is called Biophilic Wales. And this is a three year project which we are just finishing up the first year. And as part of that project, we have a work package called Grasslands for Life, which is about developing resilient grasslands and using DNA barcoding to monitor grasslands for the future. We have Plants for People, which is linking into our saving plants and fungi celebrating some of Wales's most threatened plants and what we can do to conserve them. And then a big part of this project is called Inspiring Spaces. And we're working with Swansea Bay University Health Report. And what we're doing is we have 40 sites across the health board state, from giant hospitals, to tiny health centres, which are just completely concrete with no green areas around them at all. And we're trying to see how we can improve those spaces for biodiversity and for people. So we're working with groups of volunteers, and trying to make changes to those sites, so that we can create things like relaxation spaces, so we can look at making boring grassland into wildflower havens as many things as we can to try and improve these environments, in places where people most need that benefit of the natural world.

Now, obviously, with lockdown, we can't go on site. So what we wanted to do instead was how can we bring our project to as many people as possible. So an example was 'join our growing team'. So we got wildflower seeds, native wildflower seeds. And we sent those out to volunteers across the whole of Wales and further afield. And we had thousands of people join in. The idea was people grew those plants at home. And then once they had got the plants growing, they either brought them to the Botanic Garden, or when it's safe to do so, come to some of our health board sites and plant them out. So all of the plants that



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will have been grown, they will be grown in planters and within grassland areas in order to improve the site's within our health border state. And we were really pleased because obviously as well as helping the Health Board, the idea is that people get to grow these plants at home, and just experience that sort of joy of growing something themselves and actually to the point where that flowers and we've got fabulous feedback on the work that we did in the area.

So that's what I want to talk about today. So this is just a little snapshot of some of the work that we've been doing. But there's lots more information on our website. And I'm very happy to share with you what we've been doing. Thank you

Speaker 3: Tim Upson

Thank you for inviting me to speak today. I'd like to share some of my reflections of my career in horticulture, have really an interest in plant diversity, growing it and understanding what it is, has developed. And since I've joined the RHS, how some of those perspectives have changed. Can horticulturists save the world? Quite a bold statement, and maybe deliberately so. I think the contributions that we can all make are often underestimated.

I've always had an interest in collections. This example is the recent colchicum trial held at Hyde Hall, really a collection bought together to sort out the identification and naming of many of the plants in this group. And of course, the trial to try not identified those best for garden use. And for the award of garden merit. Really pleased, this also resulted in a new monograph just published. So growing and understanding plants remains very important. We also need to be advocates for there other uses and I'd like to just share some thoughts on that.

In my role at the RHS, you do meet get to meet some quite influential people, including politicians, particularly at the Chelsea Flower Show. It's been a really interesting curve for me to understand how best to engage with them, yes, some interest in plants and gardens. But it's not until you start engaging them. With social and environmental sustainability, the role of horticulture in all of our well beings that really, they start to engage with you. A good starting point is to always chat about the weather, because we've always had some strange weather pattern, maybe an extreme event. So it's a powerful way to introduce climate change, and the importance to us and the role that plants can play in helping us to adapt /mitigate. But one thing I've realised I've been working with the climate change, with climate change will the effects of climate change all of my working life. Chimonanthus praecox I remember, flowering, maybe late February, early March, often in flower now before Christmas. Emmenopterys henryi rather enigmatic tree in the UK very rarely flowering, but my interest was piqued when it flowered for us at Cambridge Botanic Garden, in 2013. Now we know it's not to do with the age of the plants as they will flower after four or five years, in climates, such as California. But it seemed that our tree was triggered into flowering by hot summer, some quite cold temperatures in the winter, and then particularly a warm spring. And that that seems necessary to bring it into flower. And since then, of course, we have seen it flowering more frequently, particularly in 2018. So my take on this, at least, is that the climatic patterns needed to induce flowering in this tree, really just simply tend to occur very rarely in the UK. But now with changing climate that's happening much more often. We consider plants that we grow, but also looking forward in the plants that we will grow in the future. And I'm sure many people will have different examples of how they're adapting our collections. And just to take one example like Lagerstroemia indica, very rare in cultivation in this country, certainly when I started, but now really becoming a feature particularly in the south of the country. We have a lot of new plantings at Wisley, it seems to like our changing climate there. And of course, it's no mistake that we currently have a trial ongoing to investigate the hardiness of these plants, and also how well they flower

We are adapting our collections, different ways in our displays. This is the walled garden at Wisley used to be a bit of a planting of bedding with box plants. And of course, as in so many gardens sadly, they have suffered due to box moth and box blight. So this is where we use the diversity of our collections to put in a display alternative to box so different plants that may serve the same purpose in our gardens.



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Like many I've always had an interest in wildlife in the garden and of course, naturally, typically pollinators. And for me, garden plants are becoming increasingly important in supplying nectar for many of our insect lives in particular. Now, having lots of nectar availability and I love the asteraceae, those single inflorescence with numerous flowers provide a lot of nectar over a long period of time nicely illustrated by the bees here. seasonality can also be important and that's where I'll cultivated flora can play a very important role. I remember standing in a winter garden being interviewed by Radio 4 in the middle of January is about 11 1212 degrees centigrade, and honeybees were already flying. And of course, one of the few plants that they could come to was a winter flower honeysuckle *Lonicera purpusii*. I also within our garden plants, there many hybrids, often occurring in cultivation. One such example is lavandins *Lavandula x intermedia*, and it's a sterile hybrid that occurs both in the wild and cultivation. Now we talk about lavenders generally think of pollinators and of course they are, but the lavandins are particularly good, because being sterile, they don't set seed so they've continued to supply nectar to visiting insects. And just delving a little bit further. It's interesting to look at behaviour across different cultivars, and one of my favourites is this one is called Sussex. I think it's because the Corolla tube is slightly more flared than many other cultivars, which makes the nectar very readily accessible to both bees, hoverflies and a range of butterflies and moths.

So just moving on to well being and I'm sure I don't need to. I'm already talking to the converted and don't need to persuade you of the value of horticulture to our well being. But I think that's really has come to fall to the fore with the COVID pandemic, which has really influenced in emphasise the importance of horticulture and plants during this time. Now, this is from a community team of one of our Britain in bloom groups, and I could have picked many different quotes. But it was quite humbling just to read this and the work that we do, and the value that horticulture in general brings to many people in difficult situations. And really proved to be important in helping people with loneliness, and creating friendships during this period. Equally we know education is a real strength of many of our gardens and maybe more so today. But again, during the covid pandemic. It's been interesting to just now see the rise in interest in schools and other community groups really wanting to garden to start growing themselves. And it's also been really revealing for me to look at a lot of surveys, and nearly always coming out top was well being for young people and who are better than horticulturalists to provide some aspects of well being for young people to get them outside into nature.

So how does that translate into some of our gardens. This is our new fifth garden RHS Bridgewater. We're in Salford on the western side of Greater Manchester you might just be able to make at the centre of Manchester in the distance due to open in July this year. But sadly COVID means we won't now open until May next year 2021. It was the site of Worsley new Hall 154 acres combination of meadows, lakes, terraces, and woodland, but at its horticultural heart is the 11 acre walled garden. This is one area which we call the Paradise Garden. And the design intent here takes the concept from really I suppose some of the earliest gardens which are enclosed spaces with water literally planted as well really a place to escape the outside world. So I kind of think of that as well being by any other name. So I hope this will provide a wonderful space to sit, linger and enjoy. But also it's the richness of the planting here which I think people will enjoy and make it a special place for them is planted with Mediterranean plants, those from North America, and Asia. And I think that will really enrich any visit.

Moving on to some of the outside areas of the walled garden. If you look on the right at the top, you'll see some bee inspired hexagonal shapes. And this is our community grow garden where people can come grow their own vegetables and learn how to do it from experts, and also hopefully from each other. The bottom right there, you'll see the well being and therapeutic garden, several circles, all designed to create quiet spaces, show social spaces, spaces where people can grow. Now that we've already started, work working with the local NHS on social prescribing, and taking people who might be have persistent health problems, both mental and physical to some degree. And rather than treating them with medicine they've been prescribed to come to a course in the garden. And it's been fascinating to hear how they've responded, people who were really struggling to leave their own home. Now given the confidence to actually catch a bus and come to the garden, for their course each week. So just a small but hopefully powerful indication of how plants and horticulture can really help people. But



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within that well being garden, it is about the spaces and people mixing but which further by the plant diversity their plants, which we can put in there for their smells, which people can enjoy, or lavender, for example. So I've been working with people there to identify some of the best that they can use for cutting. So people can come there, smell them, cut them and take them away with them.

Another aspect of a well being and mainly how we react to the environment around us is of course colour and that's very well known and often used in many designs. This example is from Rosemoor. On the left hand side, you can see a fairly recent garden, we call it the cool garden, using water. And pastel shades create a space for people. And it's been really interesting, they really do enjoy coming into this space. And a nice contrast to the hot garden use of lots of yellows, oranges and reds much more stimulating.

So we've just been taking some of these ideas a little bit further. This is another big project at the moment the new hilltop at Wisley. This will house our science and collections, new interpretation, learning spaces as well as visitor experiences. It will be surrounded by three gardens: at the front of the building is a well being garden; to the left wildlife, and to the right yet to be started is the World Food garden. And all of those have some positive aspects on our health and well being. So just to explore some of the ideas in the well being garden. The Artist's impression there shows some different spaces. So we created some quite enclosed areas. How will people respond to that compared to much open, larger crowded spaces with people around so really trying to show and get to some of the principles behind what makes gardens particularly good for our well being. As you come up to the building, we have ribbons of plantings, which are mainly green and different textures. pines, rosemary, some azaleas. And that's really to create quite a calming effect as you come up to the building. And within these various spaces, colour palettes have been selected with great care. And here, we've actually gone down into looking at the hues of different flower colours. And which cultivars should we pick to get that right combination, and really trying to explore how subtle colour can actually influence us. So an example where we're really exploring how we can use diversity within our collections and cultivated plants for well being.

So can horticulturists save the world? well maybe not in the literal sense, but as horticulturists we do have a bit very big role in helping to tackle some of the social environmental issues that we face. So we shouldn't underestimate the value of a role that the diversity of our connections and how we can use them as horticulturists can play in enormous part in our future. Thank you very much for listening

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