

Seasonal Plants Study Tour to the North-West Coast of the USA and Canada 2017

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Headline

- In the USA and Canada, the greatest expense to nursery businesses is the cost of labour.
- Nurseries are gradually becoming more automated to help reduce the costs of labour.
- Some nurseries employ staff to look after the plants once they have reached the stores, to ensure quality is maintained.
- Many nurseries are increasing the range of plants they grow, or propagating their own plants, so that they have more to offer customers, and keep their product lines new and exciting.

Background

After a successful tour to the East coast of the USA in February 2015, the decision was made by the British Protected Ornamentals Association (BPOA) and AHDB Horticulture to arrange a study tour to the West coast of USA and Canada in February 2017. The tour was predominately aimed at 'younger' growers, students and researchers, although the tour was open to anyone involved in the ornamentals industry. A total of 16 growers, researchers, consultants and students signed up to the tour.

The aim of the study tour was to focus on the production of seasonal plants by a range of different sized nursery businesses, and the marketing strategies employed by various retailers. The nurseries visited as part of the study tour produced a range of different crops including bedding plants, patio plants, herbaceous perennials, and young / plug plants. A visit was also made to Oregon State University, to learn about the research currently being undertaken in Horticulture.

With fewer young people currently choosing Horticulture as a career path, it was felt that this study tour would help to show people who are either currently studying horticulture, or in the first few years of their career, that this particular industry is an exciting, innovative and diverse place to work.

Travel findings

North West Horticulture

The first visit of the trip was to North West Horticulture. This nursery consists of three facilities; two in the state of Washington (Mount Vernon and Mabton) and a third in Watsonville, California. In total the business covers over 200 ha with 15 ha of

glasshouses and 20 ha of stock fields. The business produces a wide range of plug plants including perennials, grasses and ground cover species as well as roses (plugs and bare roots plants), and sedum tiles for the green roof industry. Product is shipped all over the UK.

A tour of the nursery, led by Manager Mark Buckle, focussed on new plant introductions and ways to reduce their labour cost. North West Horticulture works closely with Holland and the USA in order to help bring new plants to market. They are a key partner with Ball, Heuger and Star Roses and Plants, which helps them to maintain a diverse plant range, in particular, Hellebores. A lot of their Hellebores come from tissue culture, which is rooted on site, and this has helped them to produce a lot of new Hellebore varieties.

Another interesting product was the sedum tiles (**Figure 1**), which are grown for the green roof industry. This is a product which is becoming increasingly popular, due to the requirements for a certain amount of green on buildings in cities. Small tiles are grown on the nursery, and then taken up onto the roof, in the same way in which normal roof tiles would be placed on a roof. A thin layer of soil is placed between the roof and the sedum tile. The sedum is grown on a coco fibre mat with a layer of plastic underneath, and there can be up to 10 varieties on one tile. The tiles are low maintenance, and once on the roof, only need to be upheld two or three times per year.



Figure 1. Different varieties of sedum used to form a tile (left), with the coco fibre mat underneath (right)

As with many nurseries, labour is the highest cost at North West Horticulture. To try and reduce their cost, they are currently investing in a wide range of machinery, as well as carrying out LEAN training, a method to help businesses continually improve, and provide a return on investment. Many nurseries across the USA and Canada are now implementing LEAN because of the cost of labour. One particular focus for improvement is plant movement across the nursery. North West are currently looking at ways to streamline this in order to increase production and improve productivity.

Terra Nova Nurseries

Terra Nova Nurseries have introduced over 700 new plant varieties to the ornamentals industry and over 30 of these new introductions have been recognised with awards both nationally and internationally. New plant introductions are distributed world-wide to wholesalers, garden centres, and mail-order companies.

A tour of the site was given by Chuck Pavlich, Head of R&D at Terra Nova. Of particular interest to the group was the micro-propagation laboratory. Terra Nova are particularly well-known for their work on Heucheras, as well as Hellebore, and overall they have over 800 patents on material, and 70 licences across the world. The number of plant varieties that the nursery produces is constantly increasing, and this year, there is the possibility of them having 126 new plant varieties for their catalogue.

A tour of the micro-propagation area allowed the group to see the various stages of plant production from tissue culture, from the introduction of material onto agar, to division, and finally to the rooting stage (**Figure 2**).

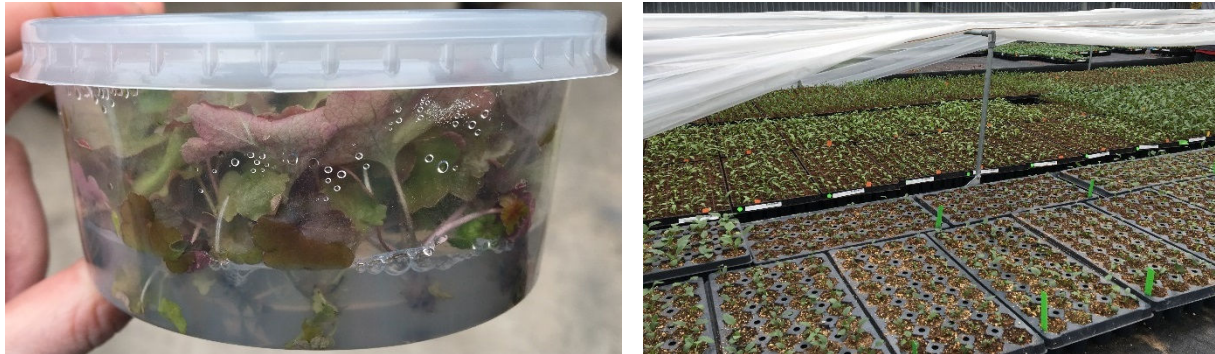


Figure 2. *Heuchera on agar (left) and rooting under fleece (right)*

Once the young plants have developed on the agar, they are transplanted into liner trays, using a coir and perlite plug from the Netherlands. This particular growing media has lots of air space which helps the plants to continue rooting. Material is transplanted using sterile forceps, and plants are graded as they are stuck. Once transplanted, trays are regularly misted with water and placed on heated, tented benches where the humidity is high. After 3-5 days the tents are raised, to increase air movement, and after 7-10 days they are removed completely.

In order to maintain their plant stocks, the nursery has two identical labs, so if anything were to happen to one lab, they would still have a copy of all their plant material.

Smith's Greenhouse

The site at Aurora, Oregon, was opened in 1997 and consists of 10 ha of glasshouses and just over a hectare of field space. In 2013, a 1.5 ha state-of-the-art glass greenhouse was added from which rain water is collected and recycled. The site is the hub of annual, hanging basket, and planter production and product is marketed all year round from the site. During the summer months perennials and shrubs are also produced, and around 450,000 poinsettias in the winter. There are 75 full-time employees and up to an extra 140 seasonal workers.

Eric Smith, 4th generation co-owner of the business, took the group around the nursery, and explained how the business has grown and developed over the years. The nursery was in the process of constructing a 3.6 ha greenhouse, complete with cascade floors and diffuse glass. A cascade floor is slightly different to an ebb and flood floor, as the floor is on a slight gradient, and the water floods up at one end, flows

down the bed and drains away. The aim is to create a system that will water plants uniformly.

The location of the nursery means that the weather throughout the year can be quite extreme. In the winter, light levels are low, but the use of diffuse glass will help to increase the amount of light that reaches the crop. In the summer, it is not uncommon for temperatures to reach over 35°C for up to 60 consecutive days, and so the new roof will also have the ability to open fully, to help regulate temperatures.

At Smiths Greenhouse, as with a number of other ornamentals growers, payment for their product is by 'pay-by-scan'. Smith's supply large box retailers such as Home Depot and Lowes, and it is only when a customer purchases a product and pays for it in store, that the nursery receives any payment for their produce. Therefore, not only does product need to look good when it gets shipped to the store, but it needs to remain looking good on the shelf, otherwise if it doesn't get sold Smith's will receive no payment for it. Consequently, the nursery employs people to work in stores like Home Depot, to maintain the quality of the plants and ensure that they will be sold. They also have a large merchandising team who will work on labelling and displays to make sure their product is eye-catching. Smith's accept that there will be some waste in store, but generally they aim for 85% sell through, with stores receiving deliveries 8-9 times per week.

Oregon State University

The plant clinic at Oregon State University has been operational since 1954, as part of the OSU Cooperative Extension Service. Clients include individual growers, field representatives of chemical and fertiliser companies and food processors, home gardeners and employees of State and Federal organisations in Oregon.

A morning visit to Oregon State University consisted of an introduction to the site from the Director of the Plant Department, Melodie Putnam, and presentations from Bill Thomas and Michael Gordon on crown gall (*Agrobacterium*) and leafy gall (*Rhodococcus*), transmission of bacteria on cutting tools and in-vitro efficacy of products for control of *Agrobacterium* and *Rhodococcus*.

In recent years, the OSU have seen a lot of plants with crown and / or leafy gall, and unfortunately there is no cure for it, plants have to be disposed of. The problem is caused by bacteria entering a wound, and so can often occur if cuttings are taken from a plant, using contaminated secateurs. The OSU was awarded a \$3M grant to investigate the problem, and see whether there were any new or currently available products that may help to control the problem, as well as investigate how bacteria move around, and to develop a sensitive and easy-to-use diagnostic kit. Currently the OSU have been successful in developing a rapid detection method for *Rhodococcus*, which takes about an hour to give you an answer, but they are still working on a dipstick method for *Agrobacterium*.

In-vitro testing of various products for potential control of crown and leafy gall gave mixed results, but there were a couple of products that looked promising. However, when these products were tested in glasshouse trials, the results were not good enough to allow any recommendations to growers at this stage.

The visit to OSU was rounded off with a quick tour of the glasshouses, where there was a mixture of old and new glass (**Figure 3**). The temperature and light within each glasshouse is controlled separately via a computer, and they use a lot of biocontrol, as well as some chemicals. There is also a greenhouse dedicated to teaching students about botany.



Figure 3. One of the old glasshouses at Oregon State University

Blooming Nursery

Blooming Nursery is a wholesale nursery dedicated to supplying the trade with a wide variety of reliable plant material, including herbaceous perennials, tender perennials, annuals, groundcovers, herbs, ornamental grasses, shrubs and vines. The business offers both finished containers, marketed under the 'Blooming Advantage' name, as well as plugs, potted liners and bare root divisions. Most product goes to independent retail garden centres and the business retail farm operation located about 10 minutes north of the nursery. Propagation occurs in a 0.5 ha state-of-the-art glasshouse before being moved into 2 ha of unheated glasshouses and polythene structures. There are also around 20 ha of field production.

The group were taken around the nursery by owner Grace Dinsdale. The nursery was originally a dairy farm, owned by Grace's family, who took the business over at the age of 25 and converted it into an ornamentals nursery.

Because the nursery grows such a wide range of plants in relatively small numbers (up to 6000 crops at the time of our visit), Grace keeps a very tight inventory, to ensure that all staff know exactly where all the plants are at all time. Staff are given iPads to use on the nursery, and record when plants are moved, sprayed, trimmed etc. and this information feeds into a central computer system.

Inputs are kept to a minimum, and solar panels are used to heat the glasshouse, although a boiler was due to be installed in spring 2017. The nursery also tries to grow as cool as possible, and uses a large house with a polythene roof and sides, which can be opened up completely in the summer (**Figure 4**). It can also be opened in heavy rain or snow, when there are less plants in there, to ensure the weight on the roof doesn't become too much.



Figure 4. Polythene house used at Blooming Nursery, where the sides and roof can be opened completely

Nordic Nurseries

This business specialises in the vegetative propagation of annuals as well as producing finished bedding plants for garden centres from just over 1.5 ha of glasshouses. The business currently produces around seven million rooted cuttings, primarily Proven Winner plant material.

Glenn Andersen, owner of the nursery, explained to the group how 60% of their production is propagation, and 40% is finished material, which they use to supply local garden centres. Propagated material, of which there are 600 varieties, is sold to small-medium sized growers. Weeks 9-15 are their peak shipping weeks, and they will start to stick cuttings in early-mid February. At this time of year, the nursery will stick approximately 6-700,000 cuttings per week. The nursery is not particularly high tech, and a lot of work is done by hand, but it is a system that works for them.

The nursery is also looking to decrease its use of chemical pesticides, and 2017 was their second year of using a greater amount of biocontrol. Nematode drenches are used on trays to help control thrips, and blue and yellow sticky traps are placed around the nursery to help monitor pest populations (**Figure 5**). Predatory mites are used for prevention of Two Spotted Spider Mite, as well as *Amblyseius Cucumeris* for Thrips and *Hypoaspis* for control of Sciarid Fly. Due to the quick turnaround of crops on site,

it can be trickier to control Aphids using biocontrol, and at the moment, a combination of biocontrols and chemicals are being used.



Figure 5. Blue and yellow sticky traps are used in the nursery to help monitor pest populations

The nursery is also gradually increasing its use of biofungicides, using them preventatively before a problem builds. In Canada there are a lot less chemicals than in the US, and there are no new chemicals in the pipeline, which means nurseries are going to have to learn how to use biopesticides effectively in order to keep control of pests and diseases.

DeVry Greenhouses

DeVry specialises in the production of premium bedding plants, herbs and vegetables for various chain stores in Western Canada. The business consists of three production facilities with around 20 ha of glasshouse production space. The business also has a large nursery growing emerald cedars which are sold to arboretums throughout North America.

A tour of the site in Chilliwack was given by co-owner Peter DeVry. The nursery is gradually becoming more automated as it looks to increase its product range and ship further afield. The nursery currently supplies to Lowes and Rona, large chain stores, as well as smaller stores and independent garden centres.

The nursery used to buy in young plugs and grow them on to the finished product, but now they do a lot of their own seed sowing, as it helps to give them more control over what they grow and when. A lot of the plants are grown on an automated bench system, which will move the plants around the nursery (**Figure 6**). They also utilise an automatic cutting machine, whereby trays are placed on a conveyor belt and sent through the machine, where they are trimmed, to encourage branching.



Figure 6. Bench system used at DeVry Greenhouses

The nursery has its own fleet of trucks which it uses to ship product out to their main delivery locations; British Columbia, Alberta, Washington and Oregon. At peak times deliveries can be going out 24 hours a day. Generally, big customers will receive up to four deliveries per week, with smaller customers receiving one delivery per week.

Rainbow Greenhouses Inc

Rainbow Greenhouses Inc. is a wholesale grower and distributor of potted plants and seasonal baskets and planters. The business serves various markets in Western Canada and North-Western USA. The company has invested in Agronomics and Visser robotic transplant systems, automated pot fillers, and assembly line planter systems. Echo Basket Systems dominate all of the newer facilities allowing basket work to be completed from the main walkways. The majority of irrigation water is applied via ebb and flood systems and watering booms which are predominantly computer controlled.

Rob O'Hara, Head Grower at Rainbow conducted the final tour of the trip. It was clear to the group that a lot of investment had gone into the business over the last few years, in order to create a more automated business, and reduce labour costs. All of the water onsite is captured and recycled, and in the newer areas of the nursery, Ergoed floors are used, rather than older style concrete flood floors, where watering can be slightly less uniform.

The nursery has also begun experimenting with the use of LED lights (**Figure 7**), which give a better level of light than the standard High-Pressure Sodium (HPS) lights. The nursery are using 'Lumigrow' lights, and are able to change the light spectrum if required. At the moment there has not been enough research into the use of LED lights to determine different light recipes for different plant species. The aim for the nursery is to eventually have a series of light sensors in the greenhouse which will link to a light computer, and light levels will be controlled automatically.



Figure 7. LED lights and automated plant transport systems can be seen in one of the glasshouses

Personal Statement

As someone who is still relatively new to working within the horticulture industry, this trip was an excellent way for me to broaden my knowledge of the production of seasonal ornamental plants, right through from propagation to selling the finished product in the garden centre or supermarket. Seeing how high quality plants are consistently produced on such a large scale through the combined use of automation and manual labour was extremely interesting, and showed how the increased use of automation could be a benefit to UK growers. The trip also allowed me to make contact with people in the industry from overseas, and has enabled me to keep up-to-date with technological developments within the horticulture sector.

However, I believe the greatest benefit for me was spending a week getting to know the other growers and associates on the tour. As I continue to develop my career in the horticulture sector, I know that the relationships I have established will continue to grow, and be of benefit both now and in the future.

Contact details

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- RSK ADAS Ltd for allowing me to take time out of work.
- Mike Smith (W D Smith & Son) and Wayne Brough (AHDB – Horticulture) for planning the trip and liaising with our hosts to arrange the visits.
- All our Canadian and American hosts for allowing us access to their business, and for taking the time to show us around and answer the many questions we had.
- Everyone who took part in the study tour for making it such an enjoyable, knowledgeable and memorable trip.



Aims of the GCRI Trust

The GCRI Trust promotes scientific research & education on cultivation of glasshouse and protected crops/mushrooms/bulbs etc., provides small travel grants to researchers involved in British horticulture and publishes technical reports of new/interesting items of potential value to UK horticulture. The GCRI Trust sponsors a high prestige biennial seminar, 'The Bewley Lecture' on international matters relating to future trends in horticulture.

Appendices

Appendix 1 - Places visited

Nursery / Research Centre	Address
North West Horticulture	14113 River Bend Rd, Mt Vernon, WA 98273
Terra Nova Nurseries	10051 S Macksburg Rd, Canby, OR 97013
Smith's Greenhouse Aurora	23150 Boones Ferry Rd NE, Aurora, OR 97002
Oregon State University	1089 Cordley Hall, 2701 SW Campus Way, Corvallis, OR 97331-2903
Blooming Nursery	Cornelius, OR 97113
Nordic Nurseries	29386 Haverman, Aldergrove, BC, Canada
DeVry Greenhouses	49259 Castleman Rd, Chilliwack, BC, Canada
Rainbow Greenhouses Inc.	43830 South Sumas Rd, Chilliwack, BC, Canada

Appendix 2 - List of participants

Name	Company / Organisation
Mike Smith	W. D. Smith & Son
Simon Nifton	W. D. Smith & Son
William Robinson	Robinson's Nurseries
Stephen Lindop	Westholme Nurseries
Graeme Edwards	Woodlark Nurseries
Caroline Shove	Bryant's Nurseries
Jemma Bryant	Bryant's Nurseries
Stanley de Villiers	Bryant's Nurseries
Christine Howard	Howard Nurseries Ltd
Gary Woodruffe	Bordon Hill Nurseries Ltd
James Wilkinson	Neame Lea Nurseries
Steven Jenkins	Ball Colegrave
Simon Davenport	BPOA
Chloe Whiteside	ADAS
Georgina Key	AHDB-Horticulture
Wayne Brough	AHDB-Horticulture

Appendix 3 - Accommodation

Date	Accommodation
Sun 19 Feb	Accent Inn, 10551 St Edwards Dr, Richmond, BC V6X 3L8, Canada
Mon 20 Feb	Best Western Park Place Inn, 201 SW Interstate Ave, Chehalis, WA 98532, USA
Tues 21 Feb	Best Western Woodburn, 2887 Newberg Hwy, Woodburn, OR 97071, USA
Weds 22 Feb	Best Western Park Place Inn, 201 SW Interstate Ave, Chehalis, WA 98532, USA
Thurs 23 Feb	The Coast Hotel, 45920 First Ave, Chilliwack, BC V2P 7K1, Canada
Fri 24 & Sat 25 Feb	Century Plaza Hotel, 1015 Burrard St, Vancouver, BC V6Z 1Y5, Canada