

# International Rhododendron Conservation Conference 2013

## An R.B.G.E. Perspective of the Issues involved in Conserving Rhododendron Collections



# Rhododendron Taxonomy and Horticulture at RBGE

- **Regius Keepers**
- Sir William Wright Smith 1922-1956  
Benmore 'acquired' 1929
- Deputy J.M.Cowan
- H.H. Davidian  
Harold Fletcher 1956-70  
Douglas Henderson 1970- 87
- **Curators**  
Roland. Cooper 1934-1950  
Edward Kemp 1950-1972  
Richard Shaw 1972-1987



*R.campanulatum* R.E Cooper





*R. loranthifolium* 'Dick Shaw

## Cultivation

Richard Shaw started to renovate and rearrange the Rhododendron Collection at Inverleith to reflect the taxonomic work being undertaken in the Garden.

Starting at the north side of the Rock Garden with the section Rhododendron, Subsections

*Cinnabarina*, *Triflora* and *Heliolepida* and linking with the *Saluenensia* and *Lapponica*

Subsections in the Rock Garden.

Copse-Subsections

*Glischera*, *Neriiflora*, *Fortunea* \* and *Pontica*

Peat walls- Subsections *Thomsonia* \* and *Taliensia* \*

Upper Woodland – *Grandia* \* and *Falconera* \*

# Recent Rhododendron Taxonomy at RBGE



- The Edinburgh Revision
- Started 1972
- Subgenus Rhododendron 1980
- Subgenus Hymenanthes 1982
- Subgenus Vireya published in 2006 and fieldwork on going



# Rhododendrons within the Living Collection of The Royal Botanic Garden Edinburgh



Edinburgh



Benmore

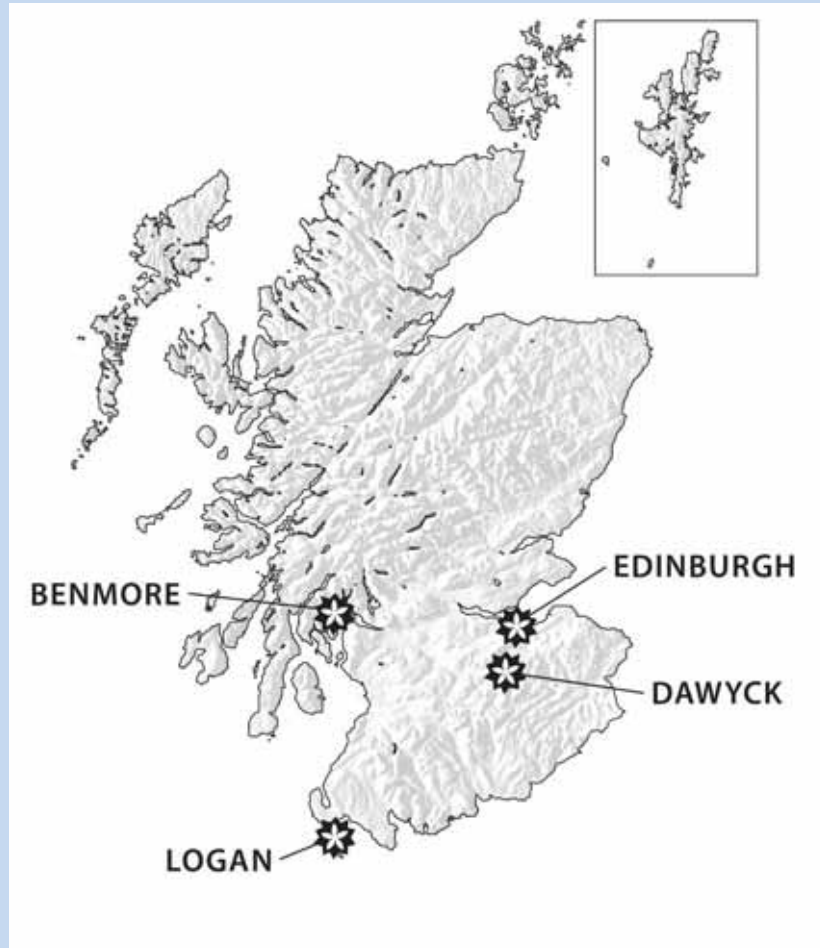


Logan



Dawyck

# Rhododendrons in the Living Collection



Currently [April 2013] the collection comprises 668 species, 1,279 taxa, 3851 accessions, 7,043 plant records and 10,243 plants. This is represented by 277 species in the Outdoor Living Collection Edinburgh, 261 species in the Indoor Living Collection, Edinburgh, 294 species at Benmore, 107 species at Dawyck and 96 species at Logan.





Isaac Bayley Balfour 1853-1922  
Regius Keeper 1888-1922



George Forrest 1873-1932



George Forrest  
7 Expeditions to SW China



Lijiang Plain







*R. forrestii* ssp. *forrestii*



*R. roxieanum* var *oreonastes* F24



*R. beesianum* F10195



*R. wardii* F25534



*R. balfourianum* F 16811



*R. fulvum* F18310

Forrest Rhododendrons

216 Rhododendron accessions alive [April 2013]





Joseph Rock



*R. vernicosum* Rock4012



*R. floccigerum* R18465



*R. fletcherianum* R 22302



*R. russatum* R.18462





Ernest Wilson



*R. argyrophyllum* ssp. *argyrophyllum* W.1210



*R. searsiae* W1343





*R. strigulosum* Wilson 1341



*R. augustinii* ssp *augustinii* Wilson 1238



*R. davidsonianum* Wilson 1274





Ludlow and Sheriff



*R. tsariense* var *tsariense* L&S 2766



*R. thomsonii* ssp *thomsonii* L&S 2847



S.B.E.C 1981



*R. lacteum x taliense* SBEC 0546

*R. sino-grande* SBEC 0104





*R. rex ssp. fictolacteam* AGS 2071



*R. adenogynum* SBLE 235







*R. trichocladum* CLD 1347





George Argent



*R. cockburnii*







*R. abietifolium*



*R. lamrialianum sub.sp.  
gunsulaminum*



*R. crassifolium*



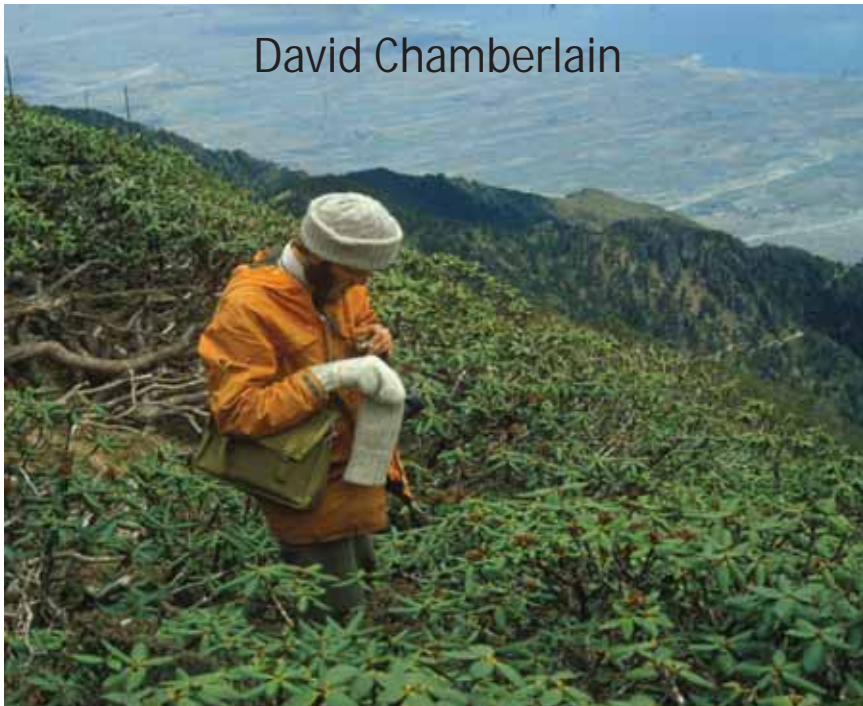
*R. ericiodes*



*R. superbum*

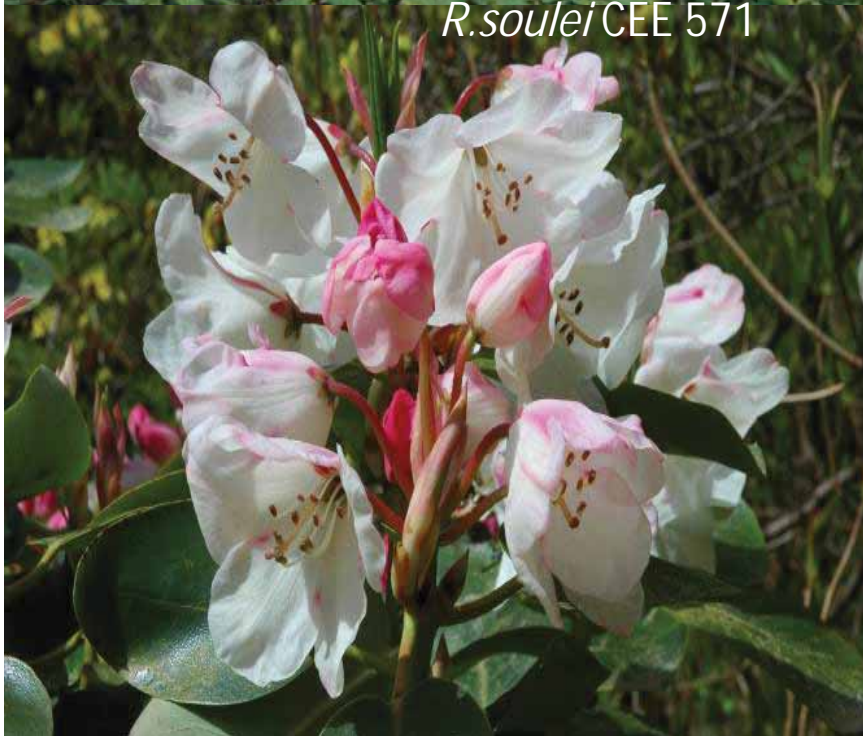


David Chamberlain



*R. soulei* CEE 571

*R. sutchuense* CEE 172



*R. wardii* FED 367









*R. montroseanum 'Benmore'*



*R. phaeochrysum var. levistratum*



*R. himantodes*



*R. dalhousiae var. rhabdotum BSL10135*

# Collections Policy

- Matching conditions required for all plants to each garden and with Rhododendron the subsection or individual species to each garden.
- Grandia – Benmore
- Vireya – Indoor Edinburgh
- Taliensia – Dawyck
- Maddenia - Logan
- With a representative collection outdoor Edinburgh



W  
V

ERICACEAE

Rhododendron  
saluenense

ssp. chameunum

(Subsection Saluenensia)

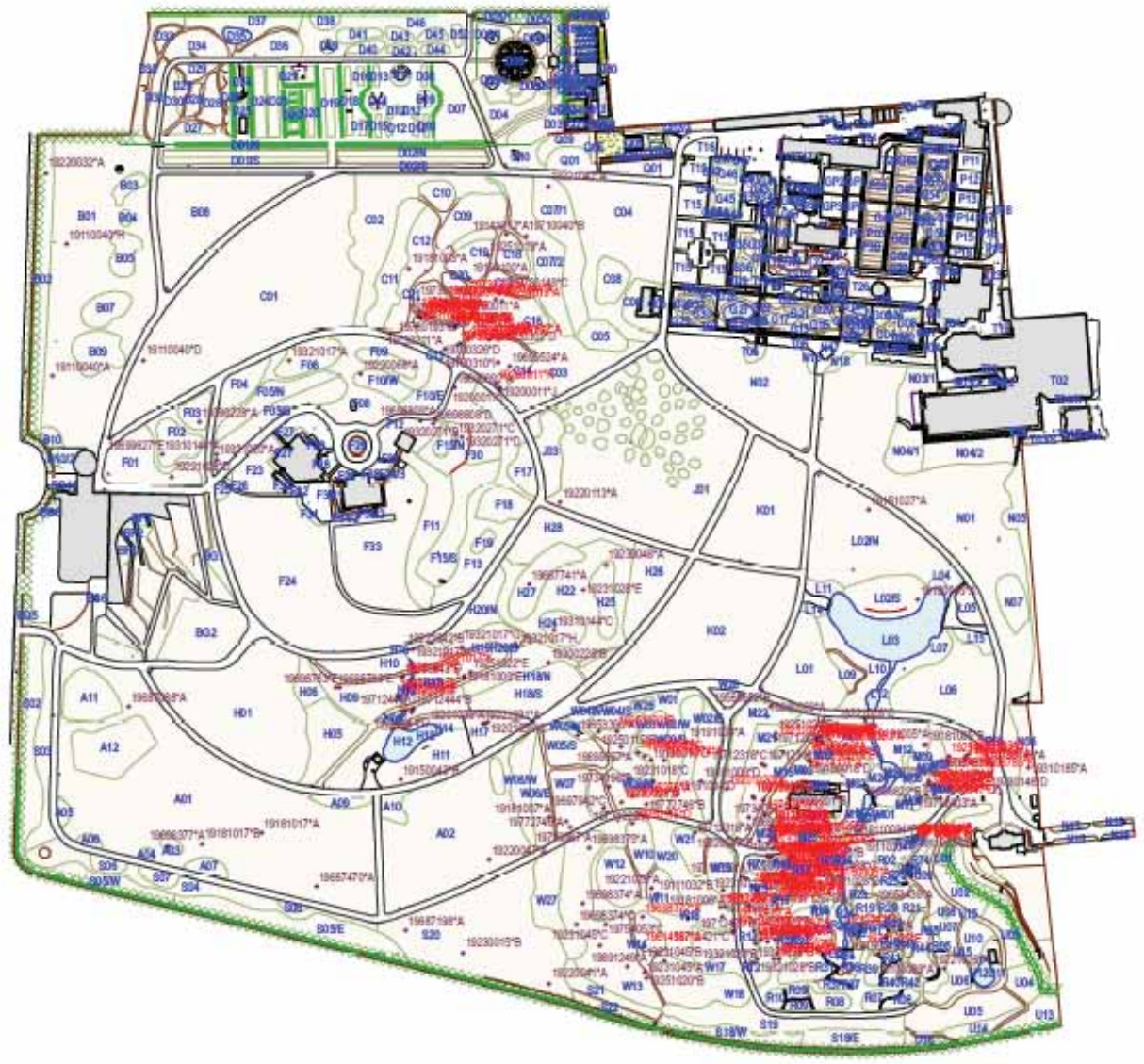
Forrest 13904

1918.0021 A

S.W. China.

N.E. Myanmar







Plants Collected by George Forrest at RBGE - Inverleith as of 20 JUN 2012

Acc # & Qual	Name	COLLF	Plants	Condition	Last Checked	Locatio	Grid
192201137A	<i>Malus yunnanensis</i>		1	good	28 Jan 2011	J01	ZZY010
192210287D	<i>Paeonia delavayi</i>		1	fair	24 May 2012	F01	ZZZZ04
192210287C	<i>Paeonia delavayi</i>		1	good	11 Aug 2009	M13	Y020
192210287A	<i>Paeonia delavayi</i>		mass	excellent	25 Aug 2009	W11	Q030
192210287B	<i>Paeonia delavayi</i>		1	fair	3 Apr 2009	805W	A015
192210297A	<i>Colonsaster aff. amoenus</i>		1	fair	22 Jul 2011	818W	ZZM050
192210317A	<i>Philadelphus purpurascens</i>		1	poor	21 Jun 2011	H17	ZZ030
192310067A	<i>Rhododendron eudoxum</i> var. <i>mesopolium</i>		1	good	27 Jul 2009	C13	E010
197124067A	<i>Rhododendron rupicola</i> var. <i>chryseum</i>		1	good	15 Jun 2009	R25	ZZZ170
197219587A	<i>Rhododendron rupicola</i> var. <i>chryseum</i>	15	4	fair	11 Aug 2009	M20	ZZT030
197219587B	<i>Rhododendron rupicola</i> var. <i>chryseum</i>	15	1	poor	19 Jan 2009	H10	T010
194200487B	<i>Rhododendron intricatum</i>	20	6	good	14 Dec 2009	R48	ZZF050
191000897A	<i>Potentilla aff. fruticosa</i>	334	1	good	28 Oct 2011	R42	ZP020
197340387A	<i>Potentilla fruticosa</i>	383	1	excellent	7 Jul 2010	R33	ZG010
196998277F	<i>Rodgersia pinnata</i>	5065	mass	good	30 Sep 2011	W13	U020
196998277E	<i>Rodgersia pinnata</i>	5065	1	good	24 May 2012	F02	ZZZL40
196998277A	<i>Rodgersia pinnata</i>	5065	mass	good	30 Jul 2010	W17	ZZZB70
191100347B	<i>Rhododendron fastigiatum</i>	5847	5	good	9 Sep 2009	R01	ZZP030
191100347B	<i>Rhododendron fastigiatum</i>	5847	mass	fair	1 Sep 2009	R13	C010
191100347F	<i>Rhododendron fastigiatum</i>	5847	5	good	28 Jul 2011	R72	ZZZR10
191100347D	<i>Rhododendron fastigiatum</i>	5847	4	good	27 Apr 2012	M20	
191100347A	<i>Rhododendron fastigiatum</i>	5847	mass	good	14 Dec 2009	R48	ZD020
192300987D	<i>Rhododendron anthosphaerum</i>	5848	1	fair	17 Feb 2011	W09/8	W040
197727487B	<i>Rhododendron irroratum</i> ssp. <i>irroratum</i>	5851	1	fair	13 Jan 2012	W09/8	ZR045
197727487A	<i>Rhododendron irroratum</i> ssp. <i>irroratum</i>	5851	1	poor	19 May 2011	W07	Y030
191110337B	<i>Rhododendron saluenense</i> ssp. <i>chamaeum</i>	5862	mass	fair	14 Dec 2009	R48	J040
197100407B	<i>Rhododendron venicosum</i>	5881	1	good	17 Feb 2012	C07/2	ZK010
191110327B	<i>Paris polyphylla</i> var. <i>yunnanensis</i>	5945	mass	good	28 Sep 2011	W14	ZD030
196877417A	<i>Ligustrum compactum</i>	5984	1	fair	21 Jun 2011	H27	ZZZ050
191100407H	<i>Picea likiangensis</i>	6748	1	excellent	20 Jan 2011	B01	ZZJ085
191100407D	<i>Picea likiangensis</i>	6748	1	excellent	14 Jan 2011	C01	ZZZB20
191100407A	<i>Picea likiangensis</i>	6748	1	fair	20 Jan 2011	B01	V090
191100407G	<i>Picea likiangensis</i>	6748	1	excellent	13 Jan 2011	C04	ZZB050
196987837F	<i>Rhododendron haliolepis</i> var. <i>haliolepis</i>	6782	1	fair	10 Jun 2011	H09	ZZP040
196987837G	<i>Rhododendron haliolepis</i> var. <i>haliolepis</i>	6782	1	fair	23 Feb 2012	M03	ZB005
196987837H	<i>Rhododendron haliolepis</i> var. <i>haliolepis</i>	6782	1	poor	23 Feb 2012	M03	ZD090
196987837I	<i>Rhododendron haliolepis</i> var. <i>haliolepis</i>	6782	1	good	23 Feb 2012	M03	ZZZJ80









Benmore



Edinburgh



Dawyck



Logan

# Climatic conditions

- **Benmore** is the wettest.
- Average rainfall-2600mm
- **Edinburgh** is the driest.
- Average rainfall-636mm
- **Dawyck** is the coldest and warmest
- Absolute minimum  
-19.8C, Dec 1995  
Absolute maximum 29.8C  
July 2003
- **Logan** is the mildest
- Absolute minimum  
-10.5C, Jan 1996



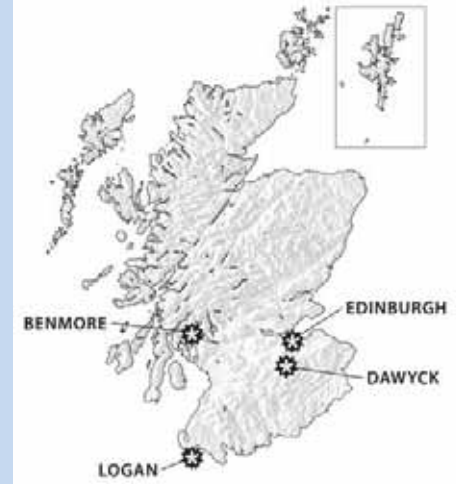
# Edinburgh







# Edinburgh



- Average rainfall 636mm
- Absolute maximum –  
29.6C Aug 1990 27.4C Jul 2006
- Absolute minimum –  
-15.5C Jan 1982
- 277 species currently growing indoor
- 278 species currently growing  
outdoor

Subsections grown outdoors include;  
Fulva, Lapponica, Neriiflora,  
Pentanthera Triflora, Saluenensia



*R. chrysodoron* CCHH 8107



*R. argipeplum* CHM3113



Edinburgh



*R. rex* ssp *fictolacteum*



*R. beanianum* KW6805





*R. gardenia*



Subgenus



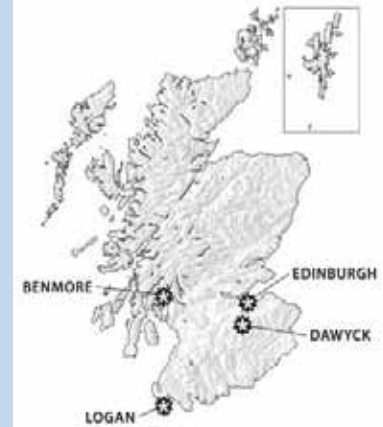
*R. sessilifolium*







# Benmore



- Average rainfall-  
2600mm
- Absolute maximum-  
29.6C July 1983
- Absolute minimum-  
-13.9C January 1983

294 species grown within the following Subsections; Arborea, Campanulata, Thomsonia, Barbata, Grandia, Falconera,



# Benmore



*R. atlanticum*



*R. cinnabarinum ssp. cinnabarinum*



*R. grande* C&S 1624





*R. kesangiae* C&S1662



*R. falconeri* subsp *falconeri*

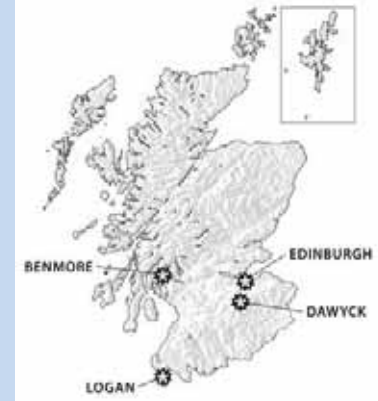


Benmore





# Logan



- Average rainfall 1000mm
- Absolute maximum  
27.7C July 2006
- Absolute minimum  
-10.5C Dec 1996
- 96 species grown
- Subsections grown; Maddenia,  
Edgeworthia



# Logan



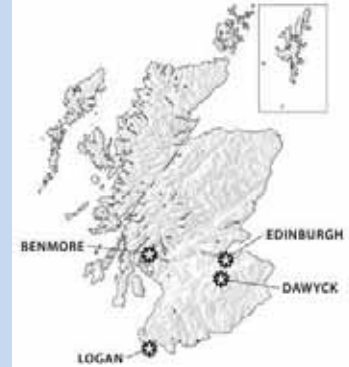
*Rh. johnstoneanum*

*R. edgeworthii*





# Dawyck



- Average rainfall-  
1000mm
- Absolute maximum-  
29.8 July 2003
- Absolute minimum  
-19.8 December 1995
- 107 species grown
- Subsections grown;  
Taliensia, Fortunea



# Dawyck



*R. calophytum* var. *openshawianum*



*R. insigne*



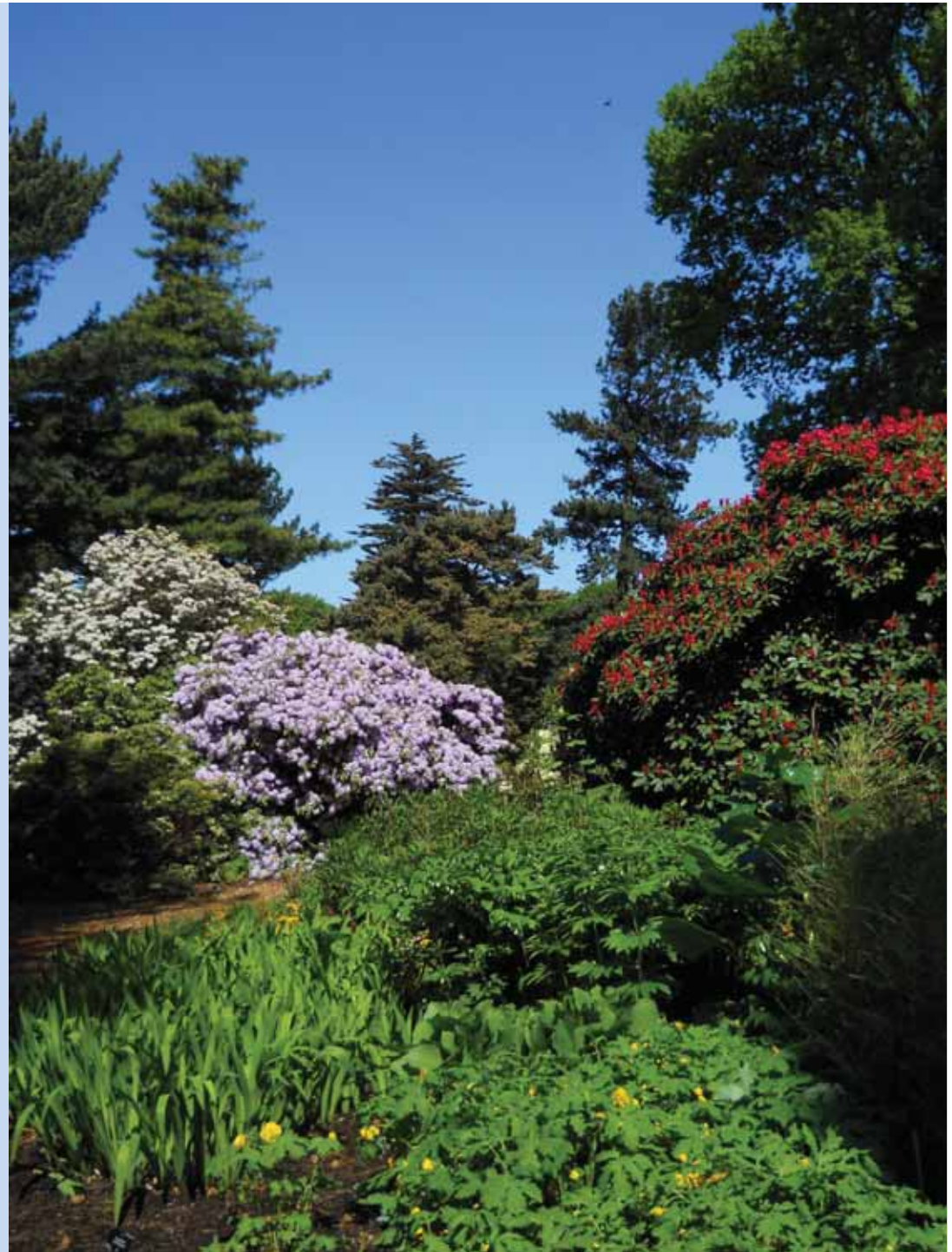






## Current challenges

- Cultivation
- Propagation
- Climate and weather
- Pest and Diseases
- Phytosanitary requirements
- Rhododendron phenology
- Fieldwork permissions









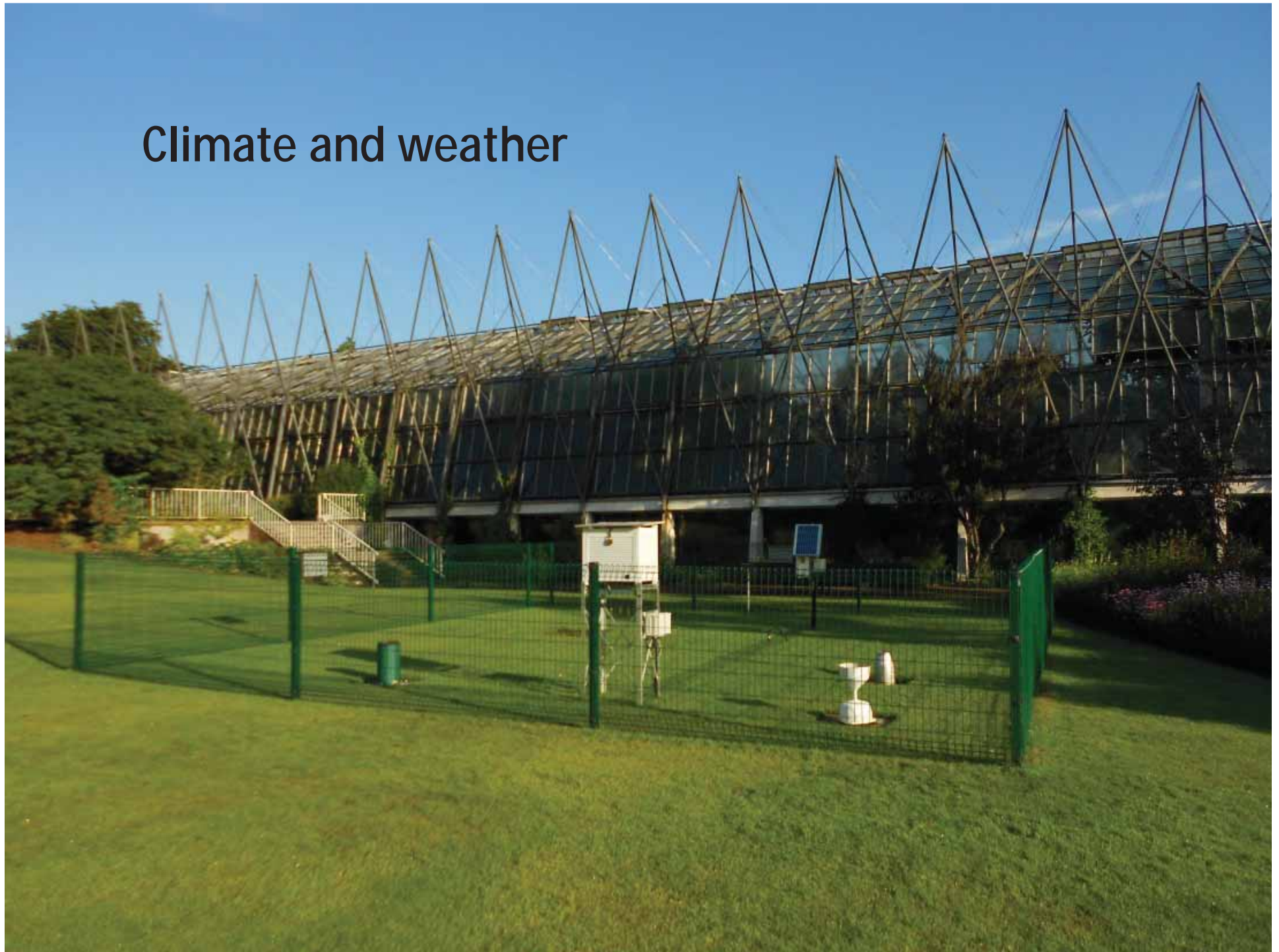




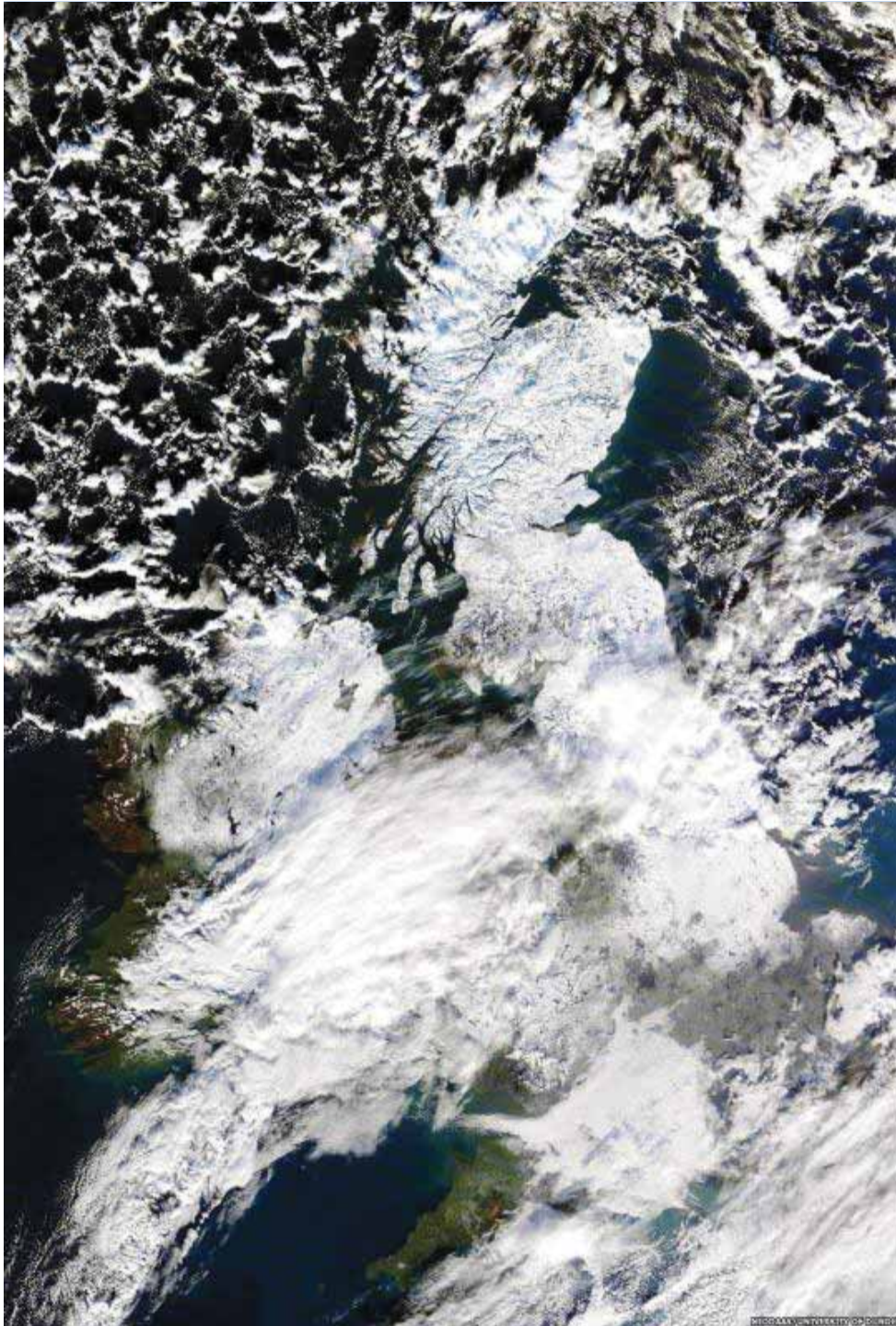




# Climate and weather







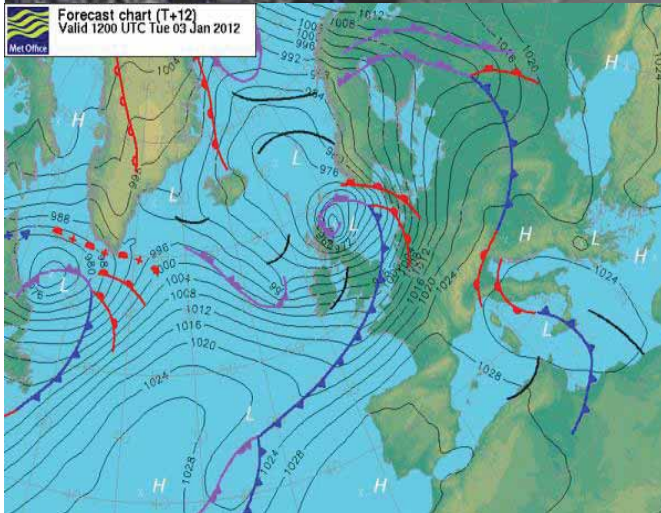
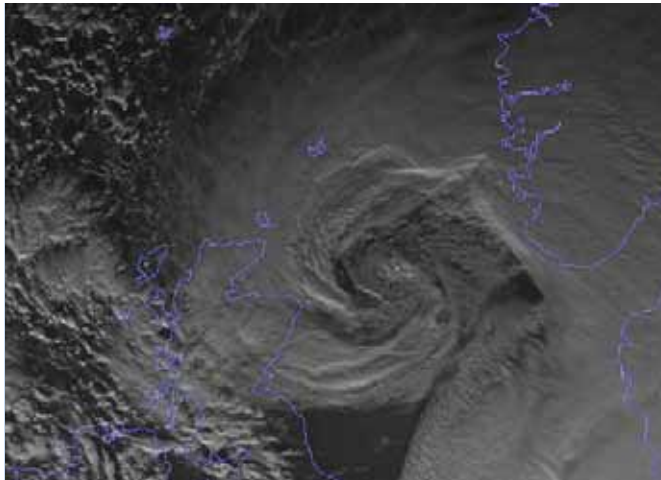
## Cultivation challenges – Severe Winters

- The winters of 2009/10 and 2010/11 were perhaps two of the coldest winters in living memory in SE Scotland.
- Resultant loss of ‘tender’ plants including Rhododendrons
- Damage to infrastructure i.e. freezing pipes and associated repair costs.
- Additional heating costs.
- Additional operational costs in keeping garden open.





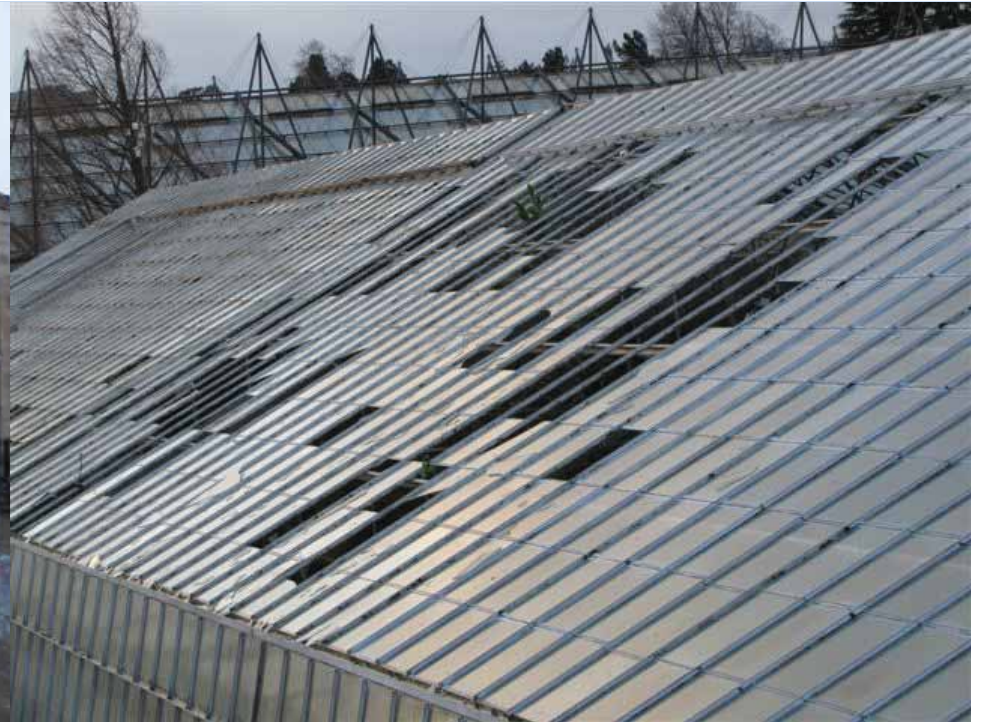




## Cultivation challenges -Wind

- Severe wind events in SE Scotland are happening more frequently throughout the year, not just over the winter months as happened in recent years year but also in spring, summer and autumn.
- Damage to the plants within the Living Collection particularly trees with resultant collateral damage to Rhododendrons.
- Scale and extent of devastation.
- Long term impacts of loss of shelter
- Damage to infrastructure.
- Resultant garden closures.
- Associated additional clear up costs and loss of income.















# Cultivation challenges

## Rainfall



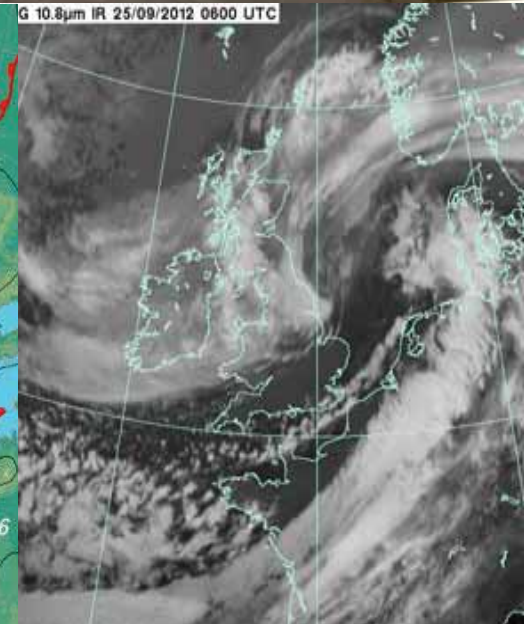
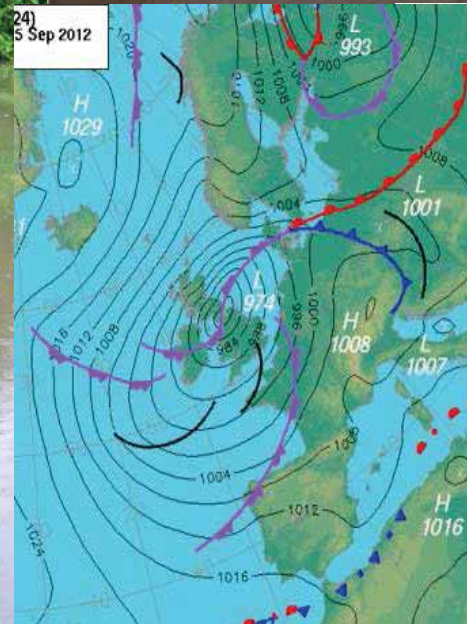
- Climate change/oscillation
- Rainfall extremes - both wet and dry.
- Below average rainfall late winter/early spring
- Wetter summers
- 2012 record rainfall in Edinburgh
- Right plant in right location/garden
- Use of mulches/change planting style
- Installation of irrigation
- Upgrade drainage



# Rainfall trends



Rainfall [mms] totals across all 4 gardens











## Cultivation Challenges

### Temperature extremes.

- Mild springs then unseasonal late frosts or as this year longer cooler/cold spell
- Milder winters.
- Warmer... summers.
- Fluctuating temperatures throughout year but particularly in spring and autumn.
- Extremes of temperature can be experienced at any time of year.
- Currently extended periods of hot weather [ 30C ] are not anticipated however.....







# Challenges ahead with New Pest and Diseases



In the last ten years there has been a considerable increase in the number of 'new' pest and diseases being detected in the UK. Unfortunately many of these have the potential to create severe difficulties to the cultivation of plants within the Living Collection of RBGE.

Climate change and the increasingly global trade in plants are contributory factors.

The key to control [other than prevention via horizon scanning and interception at source] is early detection.



# Plant movement and health legislation

## Worldwide movement

- **Requirements:**  
Import permit / Regulations
- **Growing Season inspections / treatments**
- **Phytosanitary certificate**  
Prohibited / Regulated/ Non- regulated/ Sci. Lic.
- **CITES / Scientific Licence / Derogations**

## Plant Passporting

- **Movement of some genera within UK and EC**
- **Two levels; Propagation and the finished plant**
- **Protected Zones**
- **UK/ E&W / 12345/ RP NL 23567 ZP A2**

World Organisations and Legislation

World Health Organisation (WHO) Geneva, WHO	International Plant Protection Organisation (IPPC) United Nations Rome	Food and Agriculture Organisation (FAO) United Nations Rome	Convention on Biological Diversity (CBD) United Nations Geneva
Sanitary and Phytosanitary Agreement (SPS) GATT/Uruguay/ Doha	International Standards on Phytosanitary Measures Phytosanitary certificate layout Pest Risk analysis	Improve Food Production Increase Food Security Funding projects: CABI	Reduce habit loss Make conservation areas Restore areas Food supply/ Medicines Nagoya 2011-20

## European Organisations and Legislation

European Plant Protection Organisation (EPPO) Paris	EC Food Health and Consumer Commission (DG SANCO) Brussels	World and Veterinary Office (WVO) Budapest
Euro and Euro Med countries Alert List Information on P&D and distribution	EC directive 2000/29 EC Emergency Measures Directives: Asian Longhorn Pinewood Nematode <u>Epitrix</u>	EC Member states watchdog EC missions Overseas Missions

## UK Organisations and Legislation

Entomological Research Agency (ERA) Barnsley	Forestry Commission (FC) Edinburgh / Aberdeen	Her Majesty's Revenue and Customs (HMRC) London	Department for Environment, Food and Rural Affairs (DEFRA) London
Plant Varieties and Seeds Act 1964 Plant Health Act 1967 Plant Health Order 2005 Other Orders (Pram.) Regulations: Fees	Plant Health Act 1967 Plant Health (Forestry) Order 2005 Plant Health (Forestry) (Phytophthora ramorum) Order 2004	Revenue and Customs Act 2005 CITES Red / Green Channel	Convention on biological diversity: Natural England The wildlife and Countryside Act 1981: Release of non-native/ invasives



# Pest and diseases



- Do you remember Rhododendron Powdery Mildew?





## Cultivation challenges

- Soft Scale – *Chloropulvinaria floccifera*  
*Syn. Pulvinaria floccifera*  
Cottony Camellia/Taxus Scale
- Now unfortunately found in all 4 Gardens  
[although now considerably weakened after 'colder' winters!]
- Control measures – spraying [particularly to improve vigour of the plant] and cultural.
- Weakening and disfiguring [Sooty mould]





## Cultivation Challenges – New Diseases

*Phytophthora ramorum* and *P. kernoviae*  
notifiable disease.

Draconian control measures – cut  
and burn in situ.

Has now moved to forestry and native  
plants.





## Convention on Biological Diversity



### Third objective of the CBD;

The fair and equitable sharing of benefits arising out of the use of genetic resources

### Article 15 – the framework of ABS

- Follow national laws
- Prior informed consent
- Mutually agreed terms
- Benefit-sharing

## ABS and the Nagoya Protocol



- The Nagoya Protocol on Access and Benefit Sharing of Genetic Resources
- Strategic Plan with 20 global Targets for biodiversity conservation
- Continuation and extension of GSPC and GTI
- Terms of use of traditional knowledge

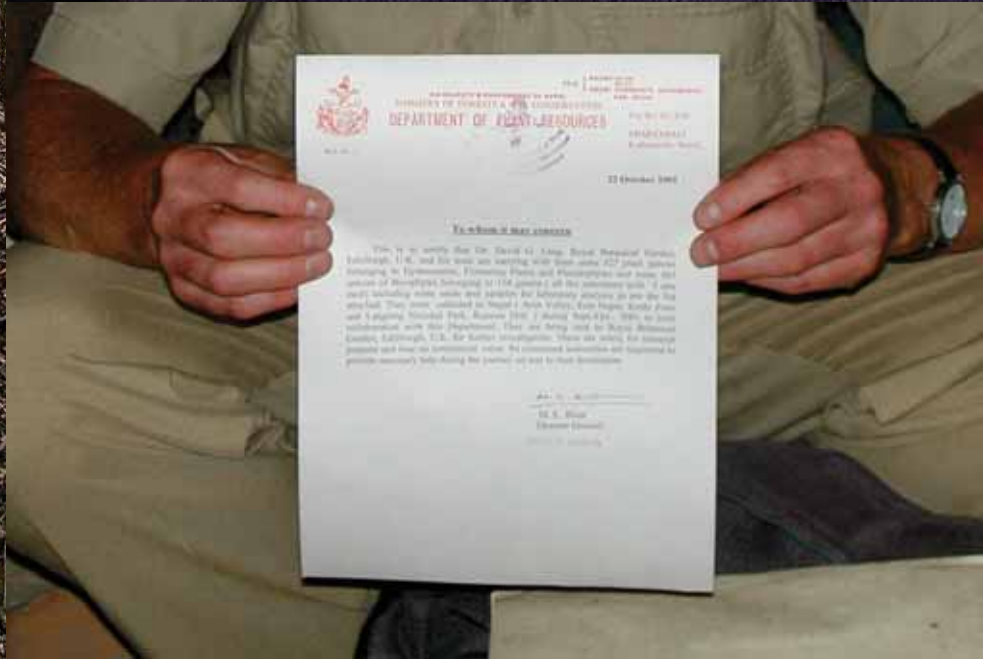
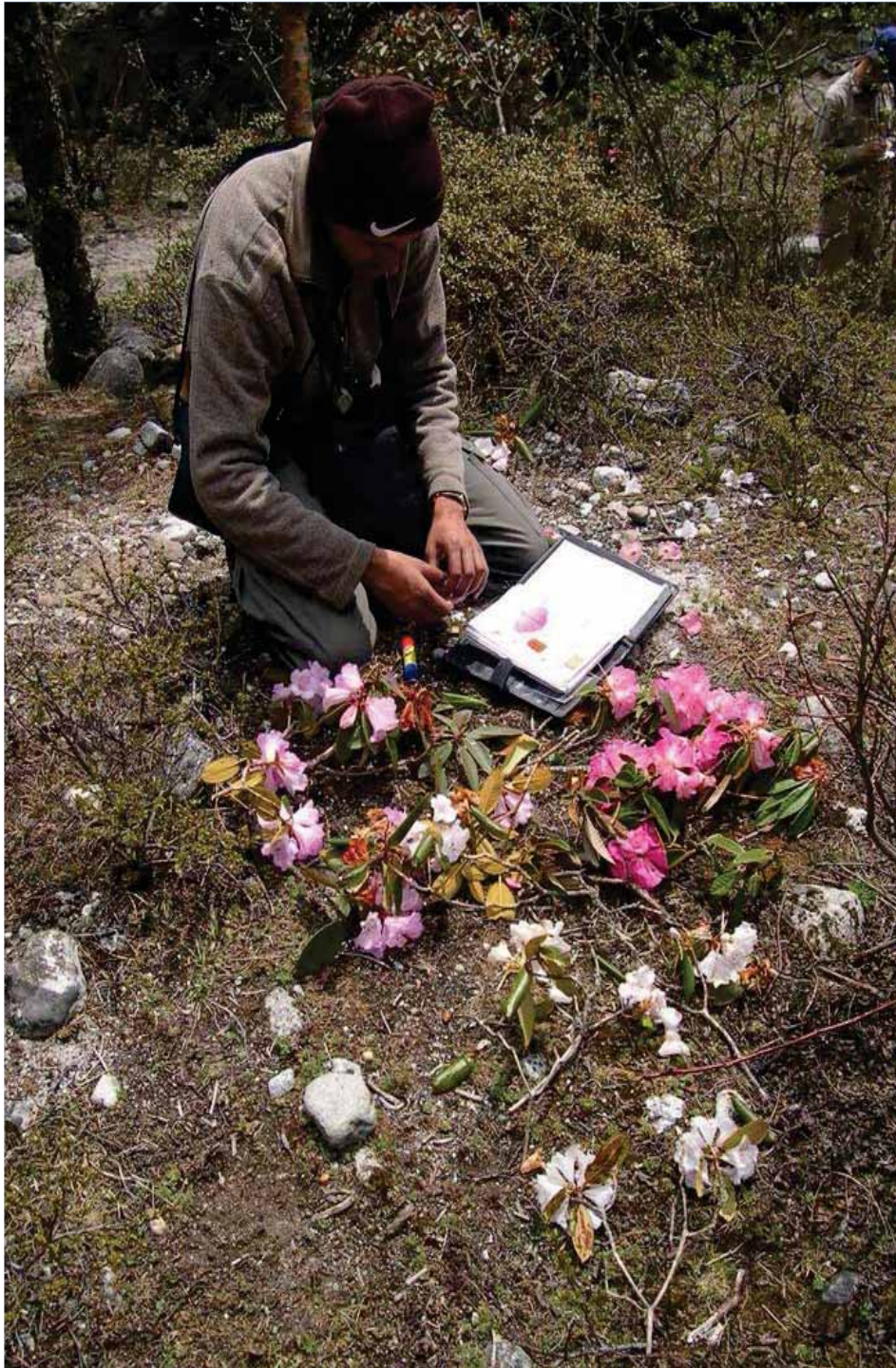
### User compliance measures suggested in Protocol

- Disclosure of origin/source in applications for intellectual property rights e.g. patent applications
- Certificates of origin/source/legal provenance for genetic resources (GRs)
- Voluntary trust building measures - codes of conducts, model contracts, model clauses for contracts
- Tracking and monitoring mechanisms
- Country Checkpoints













## Cultivation Challenges

### Invasive Non Native Species - INNS

Current estimated cost to control INNS in the UK £1.7billion Scotland £251 million.

Plants are amongst the greatest costs.

There is an exponential increase in the cost of control as the invasion progresses.

Early intervention and horizon scanning.

Public awareness



## Public Perception of Rhododendrons in UK



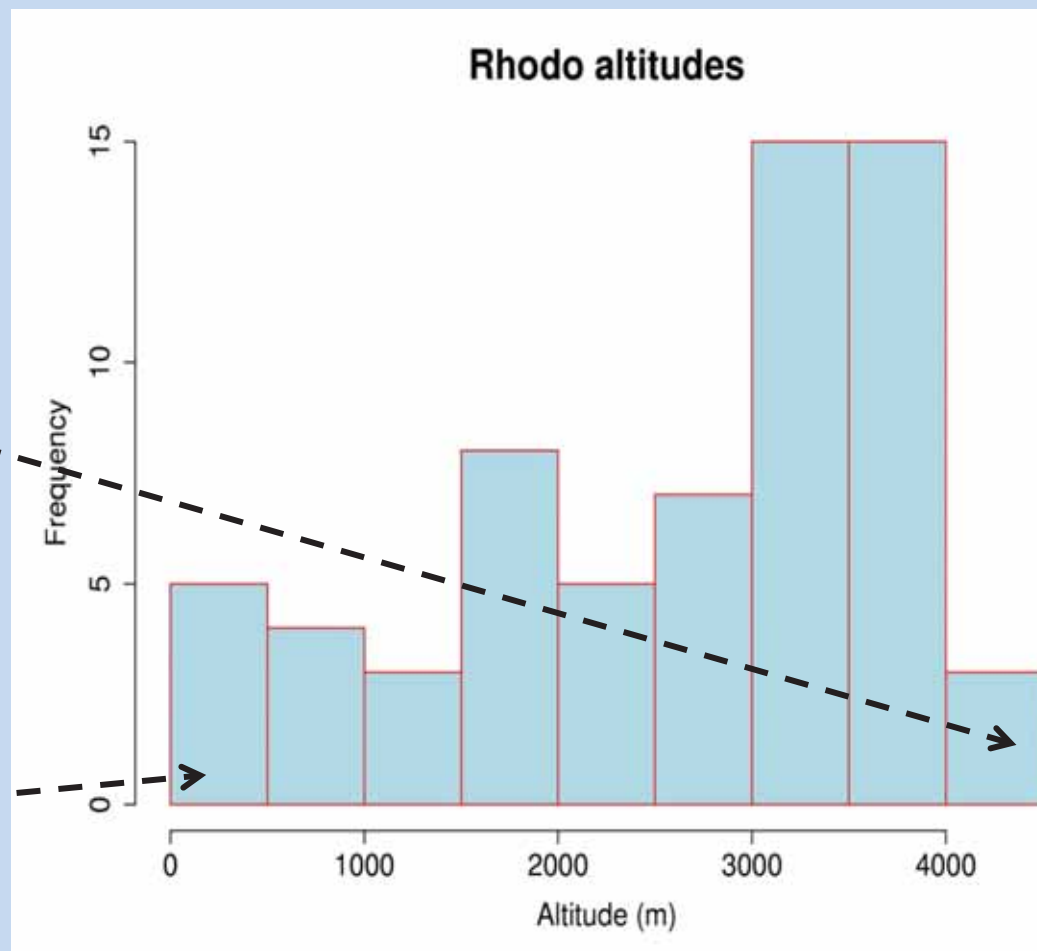


# Rhododendron Phenology Project at RBGE

*R. fletcherianum* 19754070 from 4250m,  
Xisang (Tibet)



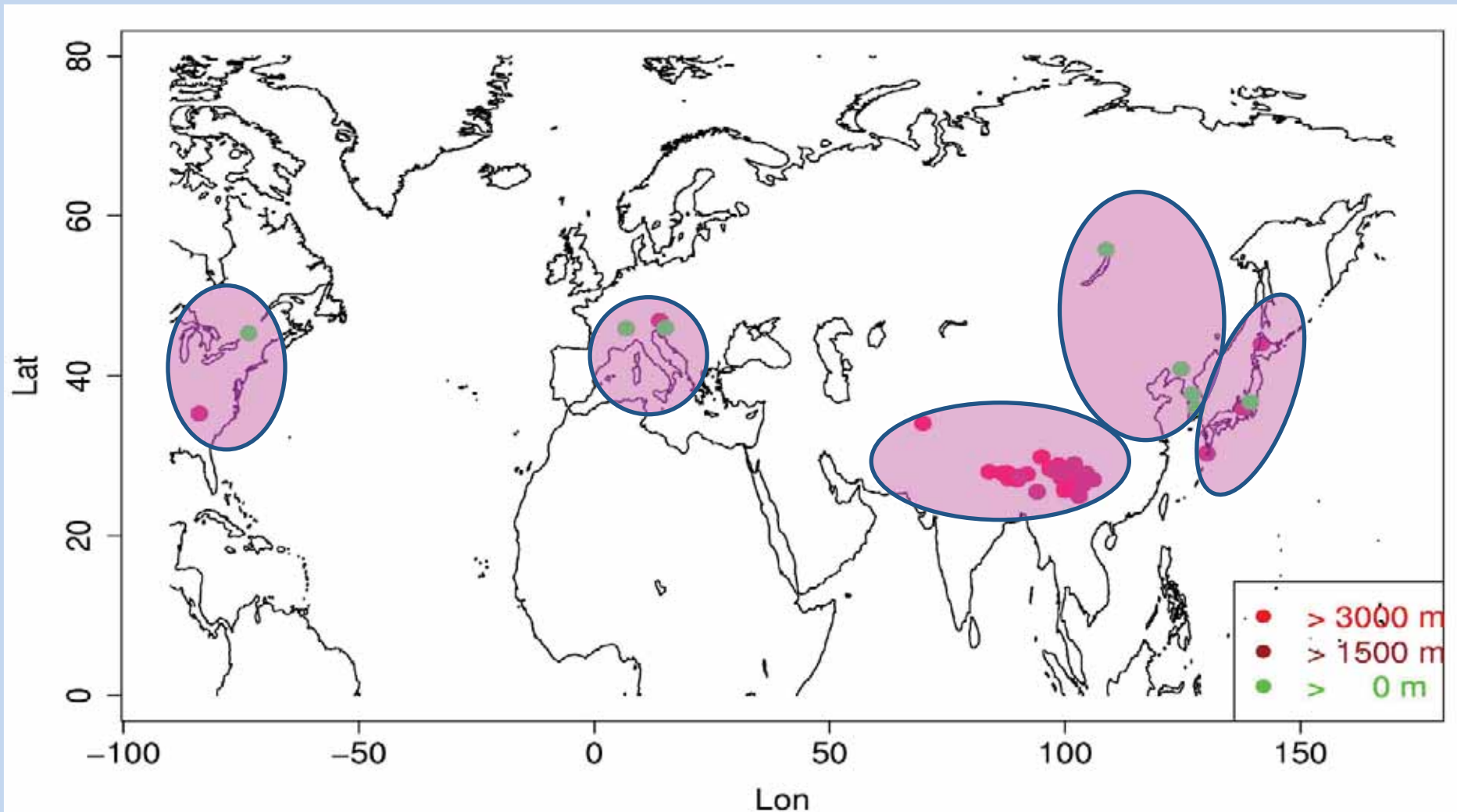
Native altitudes of accessions



*R. mucronulatum* 19770993 from sea level, South Korea



## World distribution of monitored accessions of known wild origin



E. North America

Europe

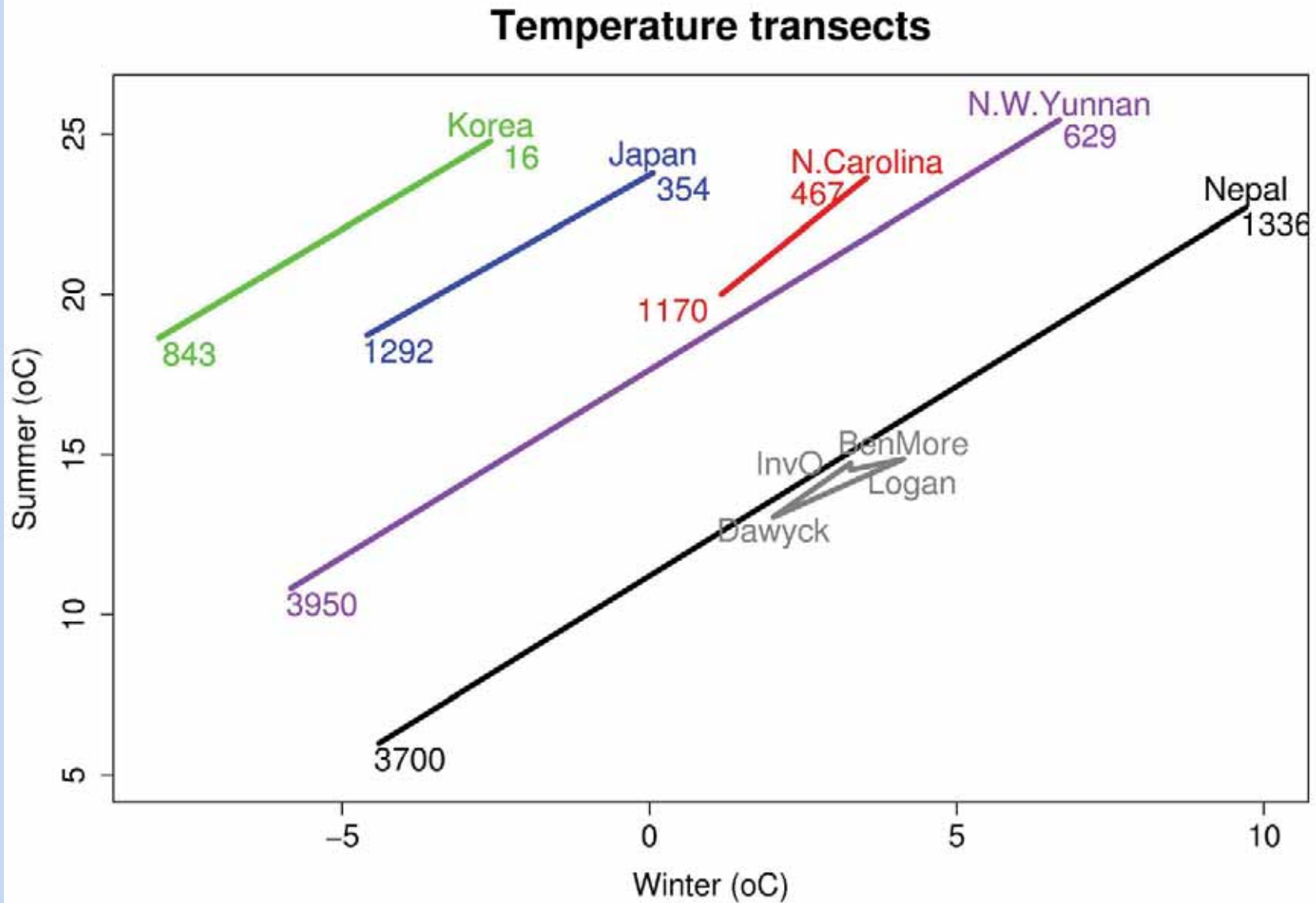
S.E. Asia

N. Asia

Japan

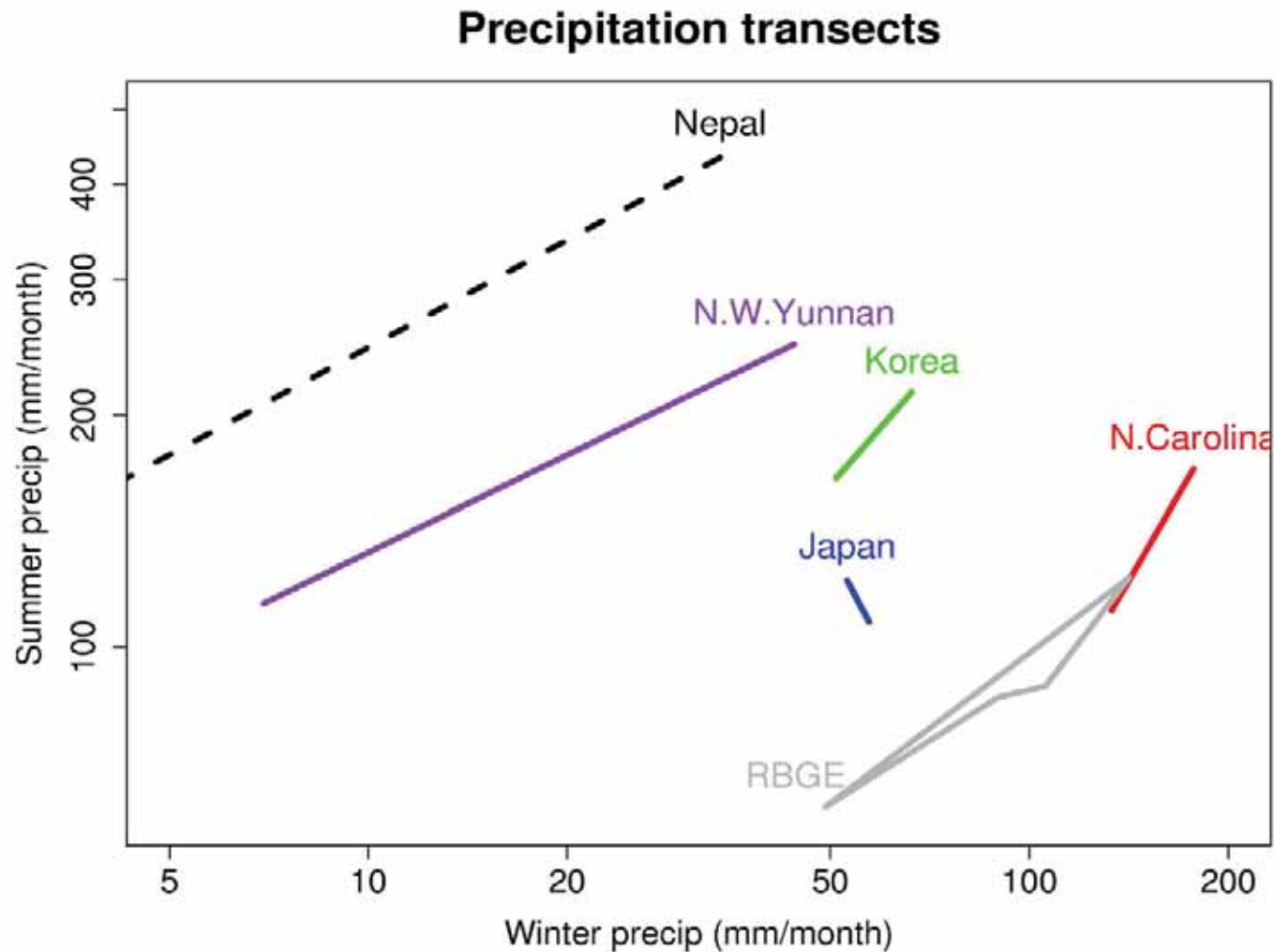


Ranges of average summer and winter temperatures with altitude for countries of origin (compared with RBGE gardens)





# Ranges of summer and winter precipitation with altitude for countries of origin (compared with RBGE gardens)

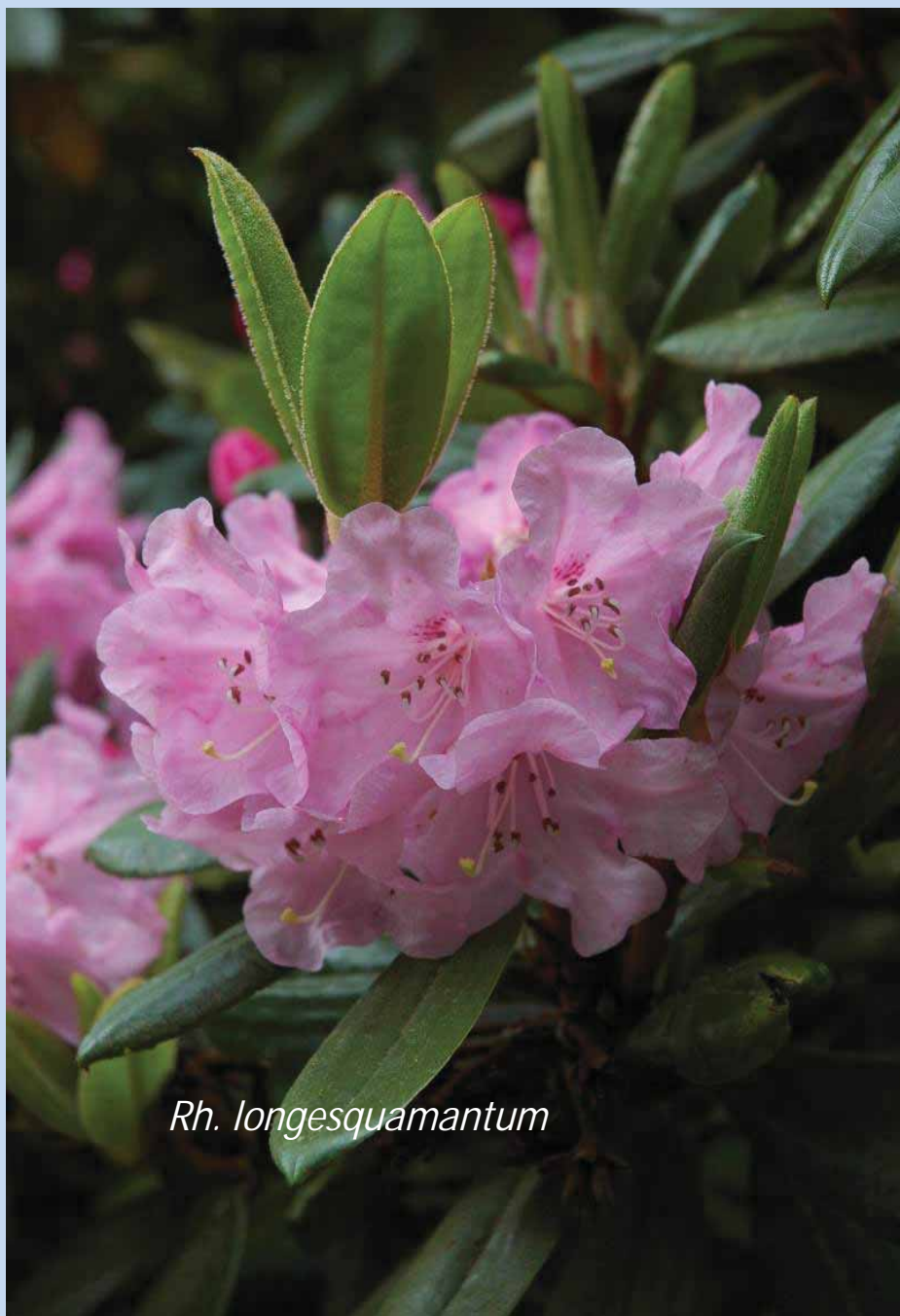




# Summary

- ❖ The Rhododendron Phenology Project has good taxonomic and global geographical coverage.
- ❖ We are monitoring mini-populations of most of our accessions which helps us to assess the within-species variability of rhododendrons (which can be large)
- ❖ Of the countries represented in this talk, Nepal (at 2500 m) comes closest to Scotland in its average summer and winter temperatures
- ❖ All four RBGE gardens are much drier in summer than the places from where our monitored accessions originally came





*Rh. longesquamantum*

# The Future

- The different challenges that we all face to successfully cultivate Rhododendrons and recent disease outbreaks have perhaps reinforced the need for us all to work more closely together in the future





## Final thoughts.....

- Continue to database all Rhododendron species in cultivation
- From this ascertain extent of particular species in cultivation
- Start and continue long term propagation and distribution programme to 'safe' sites







