

PlantNetwork Target 8 project

Practical horticulture in support of conservation of the flora of Britain and Ireland: linking *in situ* and *ex situ* conservation work

Thank you for offering to take part in the PlantNetwork Target 8 project. This leaflet gives some background to the project and outlines what we would like you to do.

BACKGROUND

Target 8 is one of 16 targets that comprise the *Global Strategy for Plant Conservation* (GSPC, 2001). The Strategy aims to halt the current and continuing loss of plant biodiversity, by 2010. The target aims for:

‘60 per cent of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes’.

Plant Diversity Challenge: the UK’s response to the Global Strategy for Plant Conservation (2004) calls for linking *ex situ* and *in situ* conservation efforts. The *Vascular Plant Red Data List for Great Britain* (2005) revealed that 1 in 5 species in the British flora faces extinction or is in major decline. It lists 349 species of which 4 are extinct in the wild, and 35 are critically endangered. In Ireland, 190 species are on the red list, of which 9 are critically endangered.

PURPOSE

The aim of the Target 8 project is to develop ways in which horticulture, in particular through *ex situ* cultivation, can support conservation of our native flora. We want to develop co-operative programmes with those working on *in situ* conservation of plants in Britain and Ireland. The idea is for PlantNetwork’s member gardens to cultivate one or more threatened species in the flora of Britain and Ireland, and in so doing to develop scientific and horticultural expertise in *ex situ* conservation of vascular plants in order to assist and support *in situ* conservation work.

We aim to grow all threatened species in Britain and Ireland in *ex situ* collections and for the knowledge gained from growing them in cultivation to assist conservation in the wild. The idea is that developing knowledge for cultivating threatened plants assist those involved at the front lines of *in situ* conservation.

GOALS

From the outset it is important to understand what we anticipate the outcome of the project to be. *Ex situ* is one aspect of an overall conservation strategy; it is not usually an end in itself. Success will not be measured by how many species of plant we have in cultivation by 2010, instead it will be judged on how many conservation projects, initiatives and action plans PlantNetwork gardens are involved with. There is little challenge to growing a threatened plant in a pot of John Innes compost. The threats facing our flora in these islands are varied, and are not an inability to grow them artificially, but the loss or degradation of habitats. Our job, as horticulturists, is to provide the skills and facilities to assist conservation work as a whole. We will be growing these plants for a number of reasons:

1. The knowledge of how to germinate, grow, flower & fruit a species is an important spin-off from the project. Assembling a complete set of protocols to cultivating the British and Irish flora will be a significant compliment to seed banks. The type of data required is given in Appendix II
2. Cultivation may allow for a better understanding of factors involved in promoting flowering or pollination. Genetic and ecological studies are often dependent upon studying cultivated plants. Very few plant collections in Britain or Ireland have the facilities or equipment for such studies, and co-operative work is vital in this area.
3. Bulking up material for re-introduction or augmentation of wild populations may be a chosen course of action, for which large-scale propagation work will be required.
4. Lastly, we must not overlook the opportunities to raise public awareness and educate visitors to our gardens.

How your garden can get involved

1. Ask the Joint Nature Conservation Committee (JNCC - www.jncc.gov.uk) for a free copy of **Plant Diversity Challenge: the UK's response to the Global Strategy for Plant Conservation**, or download it from the web (see <http://www.jncc.gov.uk/page-2494>).
2. Look at the **table of threatened taxa** (www.plantnetwork.org/projects/t8list.htm) and choose one or two that you would like to grow. You could, for example, choose species that occur in the wild in your region. This will not only make it easier to set up partnerships with those working on *in situ* conservation of the species, but will also provide greater focus to your public awareness and education programme.
 - Don't choose too many to start with, or you won't have time to carry out all the later stages of the project for every species.
 - Click on T8 in the column of the Species List to see the data sheet, which gives information on distribution, and other relevant information.
 - If you need help in choosing which species to grow, please contact Matthew Jebb (matthew.jebb@opw.ie).
3. **Let us know** which species you have chosen. The name of your garden can then be entered on the table next to your chosen species. Species are not exclusive, but the project does aim to reduce duplication of effort. You should try to find out what work has already been done.
4. **DO NOT** attempt to obtain seeds or propagules of your chosen species from the wild. The species on the list are already threatened with extinction, and furthermore are protected by law. The Millennium Seed Bank has offered assistance in providing pre-germinated seedlings for the project, and you should contact Matthew Jebb or Alisdair Hood with your requests and for advice.
5. **Find out** as much as you can about your chosen species. Look on the web, at species action plans, at Plantlife species dossiers and in conservation journals – there is a list of useful links on our www.plantnetweb.org/projects/conservweb.htm page.
6. Set up a system for **recording as much information** as you can about the origin, treatment and characteristics of your adopted species. Details about what to record (www.plantnetweb.org/projects/datafields.htm) as well as a downloadable spreadsheet (www.plantnetweb.org/projects/datasheet.xls) will enable you to submit the data to us for entry in the Cultivation and Propagation Database.
7. It is important to **experiment** with different germination and propagation techniques, and with different growing media. The aim is to find out the optimum conditions for the plant's growth, flowering and fruiting. It is important to **build up expertise and knowledge** in cultivating the taxa you have selected.
8. **Contact** all those who are studying the species and trying to conserve it *in situ*. Tell them you are growing it in cultivation, and offer the facilities and expertise available in your garden to support their work. Explain the purpose of the PlantNetwork project and the Cultivation and Propagation Database.
9. A major function of the project is to raise Public and Political awareness about our native flora and the need for its conservation. **Tell the public** and your local biodiversity partnership about the project and how your garden is contributing. We are developing a set of generic information panels that you can use as interpretative panels. You could feature your plants in your newsletters or Friends' magazines, or to mark International Biodiversity Day, held on 22 May every year. Use your plants to tell the public about the flora of Britain and Ireland, the threats it faces and what's being done to conserve threatened species. **Take photographs** of the species in cultivation and, if possible, in the wild.
10. We will continue to **report progress** on the project in the PlantNetwork Newsletter and at national and international conferences, as well as to the JNCC, in 2008 and 2010.
11. The **target date of 2010** was adopted by the Global Strategy for Plant Conservation for many of its targets including Target 8. We aim to try and have all the taxa listed on the Project Species List in cultivation by this date. We depend on as many gardens as possible in Britain and Ireland assisting if we are to achieve this.

By adopting just one, or two taxa, at your garden, you will be making a real difference for plant conservation in these islands.

THE PROJECT

Once you have identified what species you are planning to grow, step one is to contact all those people and organisations already working on that species, as well as researching other gardens with expertise in the genus. The majority of these plants, or their close relatives may already be in cultivation. The project is being set up initially at 10 gardens. In 2006, the project will be rolled out to other PlantNetwork gardens in Britain and Ireland. Co-ordination of who is working on what species is very important so as to avoid duplication, especially if we are to maximise the four growing seasons left to us until 2010.

*What the project is **NOT** about!*

- The project is *not* about making a 'stamp collection'. We are asking people to grow these plants to make sure we understand how they germinate, grow, flower and fruit and how to propagate these plants. The aim is to develop a complete recipe book to growing these plants.
- It is *not* about growing exhibition quality plants. Many of these plants will grow very happily in captivity, with no competition and abundant nutrients. This may be useful when bulking up large quantities of plants and trying to prepare exhibit-quality plants, but it is not the aim of the project. Such plants will look very different from those in the wild. It is more important to experiment with different growing media and different conditions, in order to find out what the plants require and tolerate than to grow a big healthy, but atypical, plant in a John Innes mix.
- Do *not* work alone. This project is not an end in itself. There is no purpose in growing a plant by yourself unless you are assisting in a bigger picture. You must try to get in touch with others working on the plant and find out what has already been done and what needs to be done. It may be that rather than *ex situ* work in your garden, horticultural assistance may be needed elsewhere.
- Do *not* collect seeds or material from the wild until you are well informed about protocols and legal issues. Great care must be exercised in collecting or interfering with threatened plants in the wild. A great deal of harm can be done by thoughtless collecting of seed, gathering of cuttings or removal of plants, not to mention that such activities are illegal in many cases. Since many of these plants have a very low reproductive capacity, collecting even modest numbers of seeds from the wild can seriously impact the recruitment of natural populations. In order to conserve the maximum genetic diversity in the collections and create the least damage to the wild populations, any collecting needs to be carried out carefully and in a fully informed manner.

*What we **WOULD** like you to do*

- Find out the local conservation agencies or organisations responsible for the threatened plants that occur in your area. The collaboration between gardens and *in situ* agencies is the *sine qua none* of a sustainable regional plant conservation. This project should not happen in isolation from conservation bodies.
- Establish face-to-face relationship with the conservation officer(s) responsible for the management or recovery of species to discuss issues of conservation theory and practice related to the species of mutual concern.
- Review the status of each threatened species and identify candidate taxa for *ex situ* conservation according to criteria such as, threat level, possibility of collecting plant material, likelihood of successful re-introduction, cost-effectiveness, appropriateness and feasibility of captive propagation.
- Report to PlantNetwork on the plant species you have chosen to take into cultivation. This will enable us to ascertain which garden will be custodian for which plant and ensure that there is no unnecessary duplication of collection and horticultural research efforts in the gardens across the UK and Ireland. (The benefits of a number of gardens growing the same species would include the possibility of keeping different populations as pure genetic lineages, as well as minimizing the inherent risk of pathogen transfer.)
- Collate and keep accurate plant records for each threatened plant you have chosen to grow. The records should include the provenance of the plant material (this is important for potential re-introduction programmes) as well as its germination, propagation and cultivation details. These data will then be entered into the Cultivation and Propagation database developed with Botanic Garden Conservation International.

- Be scientific in your approach to growing these plants. Keep written records of everything you do. Try to get to know the taxon 'in the field', with an eye to its habitat and ecological needs. Remember that the species may very well already be growing in sub-optimal conditions, thus even the 'best' habitat may already be second best for the taxon.

Work in partnership

For each of your chosen species, find out as much as you can about what's being done to conserve it, why it is endangered or has declined, and who is working on it. Is there a species recovery plan or species action plan for it? If not, why not. Contact *all* those who are working on the species, tell them about your part in the PlantNetwork project and offer your help (horticultural and botanical expertise and facilities). This is an important part of our project. We are aiming not simply to grow these species in cultivation, but to assist their recovery in the wild. *Plant Diversity Challenge* calls for *in situ* and *ex situ* to work together. Not all *ex situ* collections can be used for reintroduction, most won't be suitable; but cultivation knowledge may prove vital for conservation work. Discovering the limiting factors for a species is the most important base line information for others to work on. Make sure that your participation in this project is mentioned in LBAP, regional BAPs, SAPs and UK BAP, however small a part it seems to you. Tell them what the PlantNetwork Target 8 Project is.

Keep careful records

We would like you to record details of germination trials, growth and flowering and fruiting of your chosen species, recording what worked *and* what didn't. The data will be recorded in the Cultivation and Propagation Database developed with Botanic Gardens Conservation International (see Appendix). A separate record should be kept for each propagation method as well as dates of propagation. If cuttings are more successful at different times of year, this is vital information. Be especially careful to record all the failures – these are the most valuable lessons. This data should then be submitted to us, so that the information can be fed into the Cultivation and Propagation database. A simple electronic spreadsheet is available on our website, which can then be forwarded by email.

Threatened taxa are not just rare plants - factors are causing their populations to decline. This may vary from site to site but is often an overall decline associated with the changing habitats on these islands. Try to find out who has grown the plant elsewhere, or even has expertise in the same genus. As a starting point, consider some of these questions in regard to the taxon you have chosen:

1. *Does it have low seed viability?*

Seed may need to be fully ripe, or may be subject to insect or fungal attack.

2. *Does it have a low germination rate?*

What vernalisation treatments might help?

Hugh McAllister (1986) has developed a more successful treatment than the traditional damp-sand layers method for germinating *Sorbus*: Cleaned seeds are placed on moist filter paper in a covered petri-dish, and stored in a fridge at 1-3°C. The dishes are examined at fortnightly intervals. Seeds will begin to germinate, even at 1°C, and the seeds are then pricked out with forceps into ordinary compost. This method ensures that every viable seed can be successfully germinated.

Pinguicula species show a remarkable preference for surfaces that are not horizontal. It seems that the steady seepage on wet peat banks is important for their germination. *Pinguicula* growers have found that setting pots so that the surface of the growing medium is at a slope of ca 15° results in a vast improvement in germination and overall growth rates.

Glaucium flavum seeds germinate well as soon as the fruit first ripens, but if they are kept dry for a period of a week or two they enter a period of dormancy that is harder to break.

3. *Does the species show low recruitment rates?*

The habitat the species grows in may no longer be optimal for the species. New competitors may have entered the ecosystem, in particular alien species. Removal of competition by seasonal changes may once have been important – Seasonal inundation (removed by drainage), Coppicing (now neglected). Light levels may be affected by different vegetation canopies, from herb to shrub to canopy – one or all may have changed. In a natural state a mosaic of microhabitats may have supplied new seed-beds, and a dynamic succession of vegetation may have become lost. Temporary log piles or plywood sheets may be helpful in recreating fallow seed beds. Trials in a garden setting can be of immense value in understanding problems that seedlings may face. It is vital to record every failure, waterlogged pots, or dried out pots can teach us a plants dislikes. Potentially a chance observation in cultivation could be of great value in directing management of a natural site.

4. *Is the species a shy flowerer?*

A long maturing phase is not uncommon in bulbous plants. Regular repotting and feeding can be beneficial in reducing this time. Triggers, whether of heat, drought, wet or cold may be important to initiate flowering.

Carex buxbaumii appears to flower well following a brief spell in a glasshouse around March. Plants grown out of doors on the other hand remain in a vegetative state all summer.

5. *Is the plant short-lived in cultivation?*

Many plants do not survive well in cultivation, especially when grown in pots.

Gentiana verna is long-lived in the wild, but short-lived in cultivation – many such alpines naturally have exceptionally long root runs, waterlogging and stagnation are therefore probably very deleterious to them. Growing naturally on deep scree beds, which may be both well drained and aerated to several meters depth difficult to recreate artificially. Open composts of exploded bark or blocky peat with a mix of limestone grit has proved a successful medium for growing Gentians.

6. *Do fruits or seeds abort or fail to set?*

Incompatibility, lack of pollinators or predation of seed.

In Ireland it seems that *Crambe maritima* often comprises single individuals or clones at the various colonies, and almost no viable seed is set. It may be that the species is self-incompatible.

How and when to report back to us

It is vital to co-ordinate the work. The aim of the project is to spread the load of work throughout the network of gardens. Try to refer to the website regularly to see who else is becoming involved.

Publicise and display the work to the public

A central part of the project is to promote the work that plant collections can undertake in support of conservation activities. PlantNetwork will develop a generic poster about the project, which can be downloaded from the website, printed and displayed in your garden. Please try to take as many photographs as possible, not just of the plants, but the horticultural activities surrounding them. Please try to send us some of these photos so that we can use them to promote and demonstrate the project.

Timetable of reporting to us AND to JNCC

The project is being set up initially at 10 gardens. In 2006, the project is being rolled out to other PlantNetwork gardens. In order to achieve an integrated approach it is vital that the website is kept fully up-to-date with who is growing what, and in collaboration with whom. This will enable any interested parties to see the gaps and potential opportunities.

Further information

Global Strategy for Plant Conservation: available from Botanic Gardens Conservation International at <http://www.bgci.org>

Plant Diversity Challenge: available from the Joint Nature Conservation Committee at <http://www.jncc.gov.uk/pdf/PlantDiversityChallenge.pdf>

PlantNetwork website at <http://www.plantnetwork.org/target8.htm>

See DOWNLOADS for:

- a list of conservation websites and publications
- talks at PlantNetwork conferences on conservation
- PlantNetwork targets for target 8

See PAST MEETINGS for:

- the talk by David Rae and Natacha Frachon on the Target 8 Project at the conference on Practical Plant Conservation at Glasnevin in April 2005

PlantNetwork Newsletters

For further information about the PlantNetwork Project, see *PlantNet Newsletter* 24, pp.16–22; and 25, pp.26–28; *PlantNetwork Newsletter* 27, pp.14–18; and 28, pp.12–14.

APPENDIX I
Cultivation and Propagation database fields

Situation

- 1 Outdoors..... Yes/No
- 2 Outdoors in summer, indoors in winter. Yes/No
- 3 In a cool glasshouse Yes/No
- 4 In frames Yes/No
- 5 In a warm glasshouse Yes/No
- 6 In a lath or shade house..... Yes/No
- 7 Other: please specify Text

Phenology

- 1 Flowered in garden..... Number
- 2 Fruited in garden Number
- 3 Did it require artificial pollination Y/N Yes/No

Growth form

- 1 Tree Yes/No
- 2 Shrub Yes/No
- 3 Herbaceous perennial Yes/No
- 4 Short-lived perennial Yes/No
- 5 Monocarpic Yes/No
- 6 Biennial Yes/No
- 7 Annual..... Yes/No
- 8 Climbing Yes/No
- 9 Scrambling Yes/No
- 10 Evergreen Yes/No
- 11 Semi-deciduous Yes/No
- 12 Deciduous Yes/No
- 13 Marginal aquatic Yes/No
- 14 Submerged aquatic Yes/No
- 15 Free floating aquatic..... Yes/No
- 16 Parasitic (See next question) Yes/No
- 17 Name of Parasitic's Host Plant Text 50
- 18 Saprophytic Yes/No
- 19 Epiphytic Yes/No
- 20 Halophytic Yes/No
- 21 Succulent..... Yes/No
- 22 Other: please specify Text 50
- 23 Is the species dioecious Yes/No

Soil

- 1 Alkaline soil Yes/No
- 2 Neutral soil..... Yes/No
- 3 Acidic soil Yes/No
- 4 Free-draining soil Yes/No
- 5 Water-retentive soil..... Yes/No
- 6 Nutrient-rich soil Yes/No
- 7 Nutrient-poor soil..... Yes/No
- 8 Any specific requirements?..... Text 50

Container

- 1 Is the accession best grown in situ Yes/No
- 2 accession best grown in a container Yes/No
- 3 Please specify container type Text 50
- 4 Don't know Yes/No

Light

- 1 In shade Yes/No
- 2 Semi-shaded Yes/No
- 3 In full sunlight Yes/No
- 4 Indifferent to light conditions..... Yes/No
- 5 Dont know what is best light condition. Yes/No
- 6 Does plant require additional shelter..... Yes/No
- 7 If additional shelter is required; please give details Text

Temperature

- 1 Temp - min less than -5°C..... Yes/No
- 2 Temp - min between -5°C and 5°C Yes/No
- 3 Temp - min between 5°C and 15°C..... Yes/No
- 4 Temp - min between 15°C and 25°C.... Yes/No
- 5 Temp - min less 25°C..... Yes/No
- 6 Don't know Yes/No

Nutrients

- 1 Regular feeding required Number
- 2 If regular feeding required - give details Text 50
- 3 Intolerant to regular feeding required.. Number

Disease

- 1 Susceptible to pest or diseases..... Number
- 2 Animal (vertebrate) pests Yes/No
- 3 Animal (invertebrate) pests Yes/No
- 4 Fungal pests..... Yes/No
- 5 Bacterial pests Yes/No
- 6 Viruses..... Yes/No
- 7 Mineral deficiency..... Yes/No
- 8 Unknown Yes/No
- 9 Specific pests..... Text 50
- 10 Specific treatment..... Text 50
- 11 Specific pests..... Text 50
- 12 Specific treatment..... Text 50
- 13 Specific pests..... Text 50
- 14 Specific treatment..... Text 50

Propagation

- 1 Has propagation being successful Yes/No
- 2 If propagated, how easy is it..... Text 10
- 3 Seed Yes/No
- 4 Division Yes/No
- 5 Root-cuttings Yes/No
- 6 Softwood or herbaceous cuttings..... Yes/No
- 7 Semi-ripe hardwood cuttings..... Yes/No
- 8 SeedRipe hardwood cuttings Yes/No
- 9 Leaf cuttings Yes/No
- 10 Layers Yes/No
- 11 Cutting medium standard Y/N Yes/No
- 12 Cutting medium other text..... Text 100
- 13 Mist bench Y/N Yes/No
- 14 Heated bench Y/N Yes/No
- 15 Artificial lighting Y/N Yes/No
- 16 Grafts* Yes/No
- 17 Bud grafts* Yes/No
- 18 Air-layers..... Yes/No
- 19 Stooling Yes/No
- 20 Other, please specify Text 50
- 21 If grafted, please specify stock/rootstock Text 250

Seed Treatment

- 1 Pre-sowing..... Text 100
- 2 Subsequent treatment Text 100
- 3 Time taken to germinate..... Text 100
- 4 Was seed stored Y/N Yes/No
- 5 If so, for how long text..... Text 50
- 6 Does the seed exhibit short viability Y/N Yes/No
- 7 Specify treatment..... Text 100
- 8 General treatment (if none of the above) Text 100
- 9 Tissue culture used Text 100