

# 2008 Annual Research Report

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**Landscape Plant Development Center**

A national, non-profit research institute dedicated to developing durable plants

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Fall color of Silver Ball pear. Silver Ball is late to develop fall color and, as a result, does not always color well.



Promising compact selection of *Physocarpus opulifolius*

### Photos on the front cover

Top- Fall color at our Oregon research station; left center - promising selection of *Buddleia* with silvery foliage and lavender flower color; bottom left - compact selection of redosier dogwood in full fall color; bottom right - hybrid *Weigela* seedlings exhibiting a wide range of summer foliage colors.

# 2008 Research Progress Report

The Center's research progress during the last year to produce stress-tolerant plants for landscape use is summarized as follows:

## Ornamental Pears

### Background and overall status of project:

Our effort continues to develop and select superior small pear trees for landscape use. We have many selections that we have made and propagated and are continuing to observe them for potential introduction. Some of our advanced selections are being evaluated by cooperators in Georgia, Pennsylvania, North Carolina, New York, Michigan, Minnesota, Iowa, Texas, Kansas, Oklahoma, Idaho, California, and Washington. Each year additional crosses are made and hybrid populations are evaluated to select superior individual plants.

### Activities during the past year:

1. We identified one selection that appears to be sterile and it looks especially promising. It has a rounded crown, silvery foliage and develops a very nice maroon fall color.
2. A selection that is hardy in zone 4 also looks very promising for more northern climates. Foliage is similar to callery pears and it develops a good bright red fall color.
3. Reduced flowering and fruit set in spring of 2005, 2006, 2007 and 2008 is making it difficult to get good data on fruit size and fertility. We are continuing to evaluate the quality of the plants that were identified as probably sterile in 2004 and those with small fruit.



Promising sterile selection of pear in fall color

4. A couple of selections have been made in Arizona of plants that are resistant to high soil pH. These were propagated in late summer 2005 for further evaluation.
5. We are currently collecting detailed data on performance of selected plants and will use that data to make decisions on potential introduction of a number of selections.
6. Plants that were grafted with interstem pieces of some of our dwarf selections and then top worked with DeAnjou pear are now established in the



Weeping selection of *Carpinus* in foreground and maple hybrids in background in fall color.

field where we will evaluate the dwarfing potential of the selections that were used as the interstem.

## Acer and Carpinus Breeding

### Background and overall status of project:

The *Acer* and *Carpinus* breeding projects are a cooperative effort between the Center and the Morton Arboretum. Dr. Susan Wiegrefe made the initial crosses working as a postdoctoral fellow for the Center. She utilized plants growing in the collections of the Morris Arboretum, Arnold Arboretum, Holden Arboretum and the Morton Arboretum as parents. When Dr. Wiegrefe accepted a plant breeding position at the Morton Arboretum, The Center and the Morton Arboretum entered into an agreement to continue the effort as a cooperative project between the two institutions. Dr. Wiegrefe is no longer working at the Morton Arboretum but the project is continuing as a cooperative effort between the two institutions. Currently F1 populations of these genera are growing at the Morton Arboretum and at the Center's research station in Oregon. Some of the maple hybrids are also growing at Washington State University – Puyallup.



Columnar *Carpinus* selection

#### Activities during the past year:

1. Many of the F1 hybrids between the species *A. palmatum*, *A. pseudosieboldianum*, and *A. japonicum* growing at the Center's Oregon research station are now flowering. Open pollinated seed was collected in fall of 2005 and 2006 and sown in a seedbed at Bailey Nurseries in Minnesota. Resulting plants were left unprotected during the following winters. Most plants survived but some tip dieback was noted. Surviving plants were field planted in 2008 for further evaluation and potential selection of hardy individual plants.
2. Sarah Doane made crosses between *Acer pseudosieboldianum* and cultivars of *Acer palmatum* with red foliage in 2008.

3. Some of the F1 hybrids of *Carpinus* have very nice plant form and excellent foliage qualities. These are being selected and propagated for further evaluation. Most of the F1 hybrids are now flowering and seed is being collected for growing the F2 populations.

### Hybridization of *Sorbus* with closely related genera

#### Overall status of project:

We are continuing our efforts to develop superior Mountain Ash that are more tolerant of environmental stresses and have greater resistance to fireblight. Several selections were planted at our new research station in Minnesota in 2006. We propagated three selections in 2008 for evaluation in different geographic regions. Two very compact plant selections and one with more typical growth habit look quite promising.



Promising *Sorbus* selection in fall color (above). Compact selection (below) has *Sorbus X Aronia* background.



### *Clematis* Breeding

#### Background and overall status of project:

We have made good progress in developing non-vining cultivars of *Clematis*. Hybrids between *Clematis integrifolia* and *C. hexapetala* are very promising. Flowers are blue in color and upright facing. We also have many hybrids between *C. integrifolia* and *C. recta*. These have smaller flowers and are also upfacing. In addition we have some hybrids between



This promising *Clematis* selection is a hybrid between *C. integrifolia* and a large flowered vine forming cultivar.

*C. integrifolia* and several of the large flowered vine cultivars. Some of these are now flowering and are quite interesting.

### Activities during the past year:

1. Growing at the Oregon research station are plants resulting from crosses made in 2003 between *C. integrifolia* and large flowered, vine cultivars. Many of these appear to be vining in form but are shorter than many of the current vine cultivars. One promising selection is quite short and could be grown in a tomato cage.
2. Hybrid plants of *C. integrifolia rosea* x *C. hexapetala* and seedlings from other crosses made in recent years are now growing in containers and in a field planting at the Oregon research station.
3. Donahue's Greenhouse, a nursery that specializes in production of *Clematis* has been licensed to grow our selection of *C. integrifolia* x *C. hexapetala*. The plant has been named 'Center Star' and our patent application has been approved (PP17,010). 'Center Star' combines the blue flower color from the female parent and the upfacing flowers of the male parent. Flowers are 1½ to 2" in diameter. Foliage is a dark glossy green. Unfortunately, build up of propagation stock has been slower than we anticipated.
4. We are propagating three additional *Clematis* selections for further evaluation for possible introduction.



This ninebark seedling (center) is considerably smaller than surrounding plants.

## Improvement of North American Native Plants

### Background and overall status of project:

In cooperation with Dr. Robert Schutzki, Michigan State University, Dr. Mark Widrechner, North Central Regional Plant Introduction Station, we collected seeds of native woody plants in Iowa, Michigan and Minnesota in the fall of 2003 and 2004. These are being grown to select superior individual plants and to utilize in breeding. We also have made some crosses and have plants of a few species that were treated with Ethyl Methane Sulfonate, a chemical mutagen that are under evaluation.

### Activities during the past year:

1. The one resulting plant from crosses made in 2003 between *Cornus sericea* 'Cardinal' and *C. s.* 'Isanti' to develop a compact variety with brighter winter twig color looks quite promising as it continues to readily break bud at nodes throughout the growing season. Three plants from open pollinated seedlings of *C. sericea* 'Cardinal' that were treated with Ethyl Methane Sulfonate, a chemical mutagen, also look quite promising.

Plants propagated from these selections by softwood cuttings are now growing in the field at our Oregon station.

2. Hybrids between *Physocarpus opulifolius* Diabolo™ and *P. o.* 'Dart's Gold' have brighter leaf color than Diabolo™. Nurseries have been licensed and are now growing one selection that has been named 'Center Glow'. A plant patent application has been approved (PP16,894). Seedlings from crosses between 'Center Glow' and its siblings are now growing and exhibit a broad range of leaf color from green, yellow to bronze similar to Diabolo™. A number of plants have rosy red leaf color at maturity and are brighter in color. Many of these seedlings, selected for good foliage color, were planted at our Minnesota station in spring of 2007 and at our Oregon research station. We have made several selections from these plants that appear to be somewhat slower growing and hopefully will have smaller plant stature at maturity. They are being propagated for further evaluation.
3. Sarah Doane made some crosses in 2008 between *Physocarpus monogyna* and



Compact buttonbush selection



Selections of New Jersey Tea (*Ceanothus americanus*). The plant in the upper photo flowers earlier than other selections.

*P. opulifolius* selections with dark foliage color. We hope to gain the smaller plant habit of *P. monogyna* with a dark foliage color.

4. Three plants of *Cephalanthus occidentalis* that were selected from seedlings treated with EMS are growing at our Oregon Station. These appear to be more compact in plant habit. Two of these plants are being propagated for further evaluation.
5. Two plants of *Ceanothus americanus* were selected and cuttings were made in summer of 2007 to grow plants for broader evaluation. Two more selections were made in 2008. One selection flowers approximately one month earlier than the other selections. It is also a larger, somewhat more open plant and its leaves are smaller and more linear in shape.

6. We have started to acquire plants native to the dryer conditions of SW United States for use in future breeding and plant selection efforts. Woody plants of interest include: *Shepherdia rotundifolia*, *Fallugia paradoxa*, *Chamaebataria millifolium*, *Purshia tridentata*, *Amelanchier utahensis*, and *Mahonia repens*. We are also interested in some of the herbaceous perennials native in the Southwest.

### **Development of Sterile Cultivars**

#### **Background and overall status of project:**

We are working to develop sterile cultivars by modifying ploidy levels, making wide crosses and by mutation breeding techniques. We are treating plants with oryzalin to produce tetraploids. Resulting tetraploids will be crossed with diploid plants to produce triploids, which are most frequently sterile. We are cooperating with Dr. Tom Ranney, North Carolina State University, Mountain Horticultural Research Center in that effort. We have confirmed tetraploid plants of *Acer ginnala*, *Acer platanoides* and crabapple.

#### **Activities during the past year:**

1. One of the tetraploid *Acer ginnala* plants has not fruited in 2007 or 2008 while all surrounding plants of the same age that were also treated with oryzalin have fruited heavily. We are propagating this plant and hope that it will prove to be reliably sterile.
2. We continue to observe hybrids resulting from wide

crosses to identify sterile plants. Several of our selected pear hybrids appear to be sterile. Some cultivars of *Buddleia* used in breeding appear to be sterile or are of low fertility and we hope that we can select sterile seedlings that have good ornamental traits. Some intergeneric hybrids have degrees of male sterility and others appear to have female sterility as well.

3. Dr. Tom Ranney has used pollen from some of our selected hybrids to make crosses with tetraploid *Pyrus calleryana* that he has induced.
4. One of the goals in our cooperative effort with North Dakota State University is to develop sterile cultivars.

### **Cooperative Research Program with North Dakota State University**

#### **Background and overall status of project:**

We initiated a cooperative effort with Dr. David Dai at North Dakota State University in July of 2005 to utilize biotechnological approaches for landscape plant improvement. North Dakota State University has excellent facilities for tissue culture and related research activities and the Center has



*Shepherdia rotundifolia* growing in its native habitat.



Low growing *Weigela* selection



This *Buddleia* selection has survived for the last 2 years in 2 different locations in Minnesota as a dieback plant.

provided funding for a graduate student to work on the project. The project goal is to develop new landscape plants by use of various biotechnology approaches including *in vitro* mutation breeding, ploidy manipulation, and genetic transformation. Plant characteristics sought include compact plant habit, sterile cultivars of invasive species, plants with colored foliage, etc.

#### Progress to date:

1. Tissue cultures of 15 landscape plant species including *Physocarpus opulifolius*, *Viburnum*, *Cornus sericea*, *Forsythia*, *Ligustrum vulgare*, *Buddleia*, and *Berberis*, have been established. Protocols of *in vitro* proliferation, regeneration, rooting and acclimation of these species have been well developed and can now be used for *in vitro* mutation induction and chromosome doubling.
2. Two ways to induce mutations by treating *in vitro* tissues with EMS have been attempted. The first method was to treat *in vitro* shoot tips of *Forsythia*, *P. opulifolius*, and *Cornus sericea* with EMS and shoots were recovered *in vitro*. The second method was to treat calluses induced from leaf tissues with EMS in liquid medium and then regenerated shoots from treated calluses. The EMS

concentration and treatment time for each species and cultivar have been determined based on LD50 and the performance of survival shoots *in vitro* has been evaluated. New shoots were either recovered from shoot tips or regenerated from callus tissues then rooted and transferred to the greenhouse. Morphological screening of mutations is underway. We are optimizing treatment conditions (chemical concentration and treatment time) for each species. Plants recovered from *in vitro*-treated shoots of forsythia were planted at our Minnesota station in spring of 2008. The regeneration system for two *Buddleia* cultivars has been developed. Gene transformation with marker genes is underway. This system will be used to transform *Buddleia* for developing sterile and dwarf plants. Some plants of sterile *Buddleia* selections that were recovered from tissues treated with colchicine are growing in the greenhouse to observe flowering. We are hoping that creating tetraploids of these selections will make them fertile for another generation of breeding.

## ***Buddleia*, *Weigela* and *Diervilla* Breeding**

### **Background and overall status of project:**

We have many hybrid populations and selections of these genera. We have a lot of promising selections of *Weigela* at both the Minnesota and Oregon station that look promising with a broad range of foliage, flower color and plant form. We also have several selections of *Diervilla* and a number of selections of *Buddleia*. Unfortunately due to the dispute with Cornell University, we do not currently have access to many of the *Buddleia* selections that Peter Podaras and Dr. Pellett made in Maryland last summer. We contracted with a grower in Maryland to grow our seedlings because Cornell's land fees were extremely high. Cuttings from those selected plants were rooted at Cornell.



Promising *Buddleia* selection with silvery foliage and lavender flowers.



Cool Splash™ *Diervilla*

## Improvement of Operations at our Oregon Station

### Background and overall status of project:

We continue to expand activities and improve our capabilities at our Oregon research station. The poly greenhouse constructed in 2004 is being utilized heavily for propagation of selected plants. Peter Podaras sent cuttings from many selections from Cornell to our station manager Sarah Doane who propagated them. We've expanded our container area and soon need to expand it again. The potting shed has been a big asset in facilitating this increased effort. Field plantings have also increased as we have added to both our tree and shrub populations. We continue to evaluate plants in the field and discard less desirable plants.

## Activities at our Minnesota Research Station

### Background and overall status of project:

The Center was given 6.75 acres of land in a housing development in Lake Elmo, Minnesota by the Robert Engstrom Company. We initiated some activity at this site in spring of 2006 by planting many of our *Buddleia* selections and

also several *Weigela*, *Pyrus*, and *Sorbus* selections. We added a lot of additional plants in 2007 and 2008. The Minnesota station provides a valuable resource for evaluating our selections in a zone 4a site for evaluation of cold hardiness and also enables us to plant F2 hybrid populations for initial screening for cold tolerance. A drip irrigation system has been established and we are connected to city water. Landscape fabric is installed between the shrub rows to minimize labor needed for weed control. A local farmer cropped most of the land again in 2008.

### Activities during the past year:

1. As expected, most of the *Buddleia* selections planted in 2006 and 2007 were not cold hardy, but several selections did winter over in both winters without any added protection. We will continue to evaluate the plants with the best aesthetic qualities of those survivors and are also using them in further hybridization efforts to gain even greater cold tolerance.
2. Plantings made in spring of 2008 include selections of *Pyrus*, *Ceanothus americanus*, *Buddleia*, and *Cornus*.
3. Some *Pyrus* selections were winter killed but the majority of the selections planted in 2006 and 2007 survived.

4. Advanced generation hybrids of *Physocarpus opulifolius* are quite nicely established and provide a broad range of foliage color. We have also been able to select several smaller plants and powdery mildew infection is enabling us to select individual plants that are more resistant.
5. Many of the *Weigela* selections suffered some tip dieback last winter which has allowed us to select individual plants that possess greater cold tolerance. One selection that did not suffer any dieback has a very low, wide spreading growth habit. That plant bloomed profusely with reddish purple flowers.

## Status of New Introductions

Our variegated selection of *Diervilla sessilifolia* looks very promising. A patent has been received (PP 19,391) and it will be introduced in 2009 through the Novalis program under the trademarked name Cool Splash™. We distributed plants to cooperators in spring of 2007 for evaluation under different growing conditions and in different climates. Interest is gaining for landscape use of Silver Ball™ pear and 'Center Glow' ninebark. 'Center Glow' ninebark was featured in the September 2007 issue of *Fine Gardening* magazine. The Iowa Nursery Association listed Silver Ball™ pear as one of its 2007 plant picks and it was featured in the Iowa Gardening Magazine.

# Hardy Plants for Landscaping and Restoration in Northern Tourism Areas

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Map showing the location of the University of Oulu, Botanical Gardens and Lapland Vocational College in Finland. The implementation area of the LANDSCAPE LAB project is marked in red. The demonstration areas established in the LABPLANT subproject are located inside this area.

## Introduction

Tourism in northern Finland has traditionally concentrated on winter recreational activities. Large tourist centres are located especially in the fell areas of Finnish Lapland. In recent years, local tourist entrepreneurs have focused on planning also on summer recreational activities in order to attract tourists during the summer months. More attention has also been paid to the green environment in and around the tourist centres. Problematic issues are the disordered landscapes and erosion caused by human activities. Northern Finland

belongs to the northern boreal vegetation zone, and the harsh climate makes landscaping and restoration especially challenging.

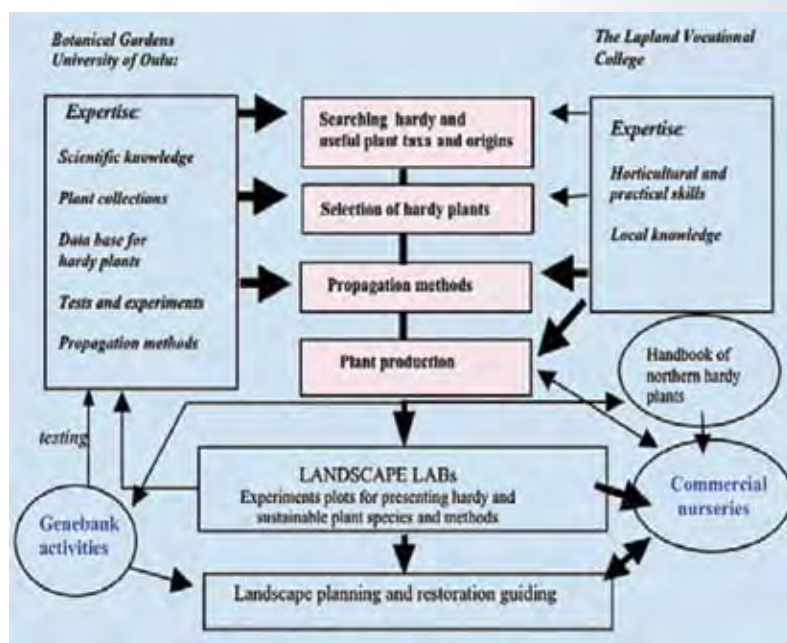
In autumn 2004 a European Union LIFE Environment project “Tourist Destinations as Landscape Laboratories - Tools for Sustainable Tourism (LANDSCAPE LAB)” was launched. The project was coordinated by the Arctic Centre of the University of Lapland, Finland. Several partners were involved in four parallel subprojects of the project that ended in October 2007. The project produced new knowledge on the environment-related attitudes and land use, and developed and presented methods that tourism operators can use to estimate and promote the sustainability of tourism.



In vitro propagated seedlings of yellow wood violet (*Viola biflora*).

## LABPLANT subproject

LABPLANT subproject was implemented by the Botanical Gardens of the University of Oulu and Lapland Vocational College, Department of Natural Resources and Environment in Rovaniemi. The aims of it were to list and select hardy plants for sustainable landscaping and restoration in northern areas, to develop propagation methods, to produce and transplant material to demonstration areas, and to produce a guidebook about hardy plants for the northern tourism areas.



The scheme was made at the beginning of the LABPLANT subproject. It presents the expertise of the partners, the different stages of the work and the end results of the subproject.



Students from the Lapland Vocational College planting e.g. bog bilberry (*Vaccinium uliginosum*) in a demonstration area located in Pallas-Yllästunturi National Park near the hotel and parking area. With the plantings the old eroded trail is merged into the surrounding vegetation. The new hiking trail is seen on the right.

During the subproject over 300 hardy plants were listed and over 100 species were propagated from seeds or cuttings or *in vitro* by micropropagation. Micropropagation was used for several plant species, since it also offered the possibility to propagate plants during the long winter months. It is an efficient method to produce large amounts of plant material in a limited time schedule, such as in the LABPLANT subproject. Micropropagation was also the preferable method for the species from which a limited amount of propagation material was available. The plants propagated were planted both in the demonstration areas and into the collections of the Botanical Gardens and Lapland Vocational College.

The six demonstration areas are located in the fell region of northwest Finnish Lapland and serve as living examples of sustainable landscaping and restoration. They represent habitats that were identified in the tourism areas: a rather

densely built tourist village where many traditional ornamental plants were used; the transition zone between the 'urban' village and natural landscape with a mixed composition of native plants and ornamentals; and natural landscape where only native plants propagated from local wild plants were used. Future monitoring will be conducted at the demonstration areas, since they

are valuable places for studies and research about plant use and success. The demonstration areas and plant collections in the Botanical Gardens of the University of Oulu and Lapland Vocational College, will also act as gene banks.

### The guidebook about hardy plants of northern tourism destinations

The listed hardy plants and examples of their use in different habitats are presented in the guidebook written about hardy plants of northern tourist destinations. It gives a general overview about northern nature, and describes the possibilities of sustainable landscaping and restoration. Plant propagation methods and the established demonstration areas are also presented. The guidebook written in Finnish, with an English summary, figure legends and table texts, contains a total of 96 pages. Though aimed for the public in northern and especially in northern tourism areas, the guidebook has gained interest among landscape planners and educational institutes throughout Finland. The electronic version of the guidebook, further information and other publications of the LANDSCAPE LAB project and LABPLANT subproject can be found in the Internet: <http://www.arcticcentre.org/landscapelab>



A very good Siberian crab apple (*Malus baccata*) growing in the Oulu Botanical Gardens. It was grown from seeds collected in South Korea by the Nordic Arboretum Committee in 1976. There are several trees from this seed lot but this individual is the most beautiful with big flowers around the branches. The tree has been hardy e.g. standing over the cold winters in the 1980's.

## Hardy plants for northern landscaping and restoration

When listing the hardy plants, results from previous similar research and plant selection projects, and the plant collections and databases of the participating institutes were valuable sources. Most of the plants mentioned in the list are native to Finland. These wild plants are especially suitable for the restoration of damaged areas. Several ornamentals, introduced and native, as well as new potential species are also included. All plants mentioned in the book can not be found in the nurseries yet, but many of them are for sale. For instance germander spiraea (*Spiraea chamaedryfolia*), knotgrass (*Aconogonon divaricatum*) and avens (*Geum 'Borisii'*) are commonly used ornamental plants. Shrubby cinquefoil (*Dasiphora fruticosa*) 'Tervola' and cowslip (*Primula veris* ssp. *macrocalyx*) are examples of plants taken to cultivation from plantings in northern Finland. Interesting plants for nursery business are also growing in the Botanical



The only specimen of red-leaved downy birch (*Betula pubescens* f. *rubra*) in nature was found in the early 1970's in northern Finland. A micropropagation method for the tree was developed at the University of Oulu Biology department.

Gardens, for instance expedition material from Western Siberia, Russian Far East and South Korea. New potential plants for northern landscaping are for example a good provenance of Siberian crab apple (*Malus baccata*), cranberry bush (*Viburnum edule*) and *Hedysarum austrosibiricum*

Good coniferous trees for northern landscaping are of course native Norway spruce (*Picea abies*), Siberian spruce (*P. a.* ssp. *obovata*) and Scots pine (*Pinus sylvestris*). Of foreign species Swiss stone pine (*Pinus cembra* ssp. *sibirica*), Siberian larch (*Larix sibirica*), tamarack (*L. laricina*) and black spruce (*Picea mariana*) are hardy. Common juniper (*Juniperus communis*) which in the southern part of Finland can grow also as a small pyramidal tree grows in the north as a

low spreading shrub. The mountain juniper (*J. c.* ssp. *nana*) has a low prostrate growth habit, which is an adaptation to the harsh conditions of northern fell heaths. Potential coniferous shrubs for the north are also Russian arborvitae (*Microbiota decussata*) and dwarf Siberian pine (*Pinus pumila*). Russian arborvitae with its dense prostrate growth habit has become popular garden plant in Finland in the past years. As a big shrub growing *P. pumila* is a rather new species in Finnish nurseries. It, and especially, the gray needled form 'Glauca' are a valuable

addition to northern landscaping plants and possibly will replace in the future now so common mountain pine (*Pinus mugo*).

Several deciduous trees are hardy in the north. Handsome, on dry soil growing silver birch (*Betula pendula*) with pendulous branches is the most popular street tree in northern Finland. Downy birch (*B. pubescens*) is more common in the north, it grows also on peatlands. Some forms and varieties of these native species, like rare red-leaved downy birch (*B. pubescens* f. *rubra*) and curly birch (*B. pendula* var. *carelica*), are important ornamental trees in the north. Native European mountain ash (*Sorbus aucuparia*) is a versatile woody plant that can be grown as a large shrub or a single-stemmed tree. It is beautiful in different seasons, abundant white flowering occurs in June, red berries that attract birds ripen in August-September, and the leaves have beautiful red autumn coloration. Introduced Asian mountain ashes *S. sambucifolia* and *S. tianschanica* are grown in the Botanical Gardens. They likely



Mountain avens (*Dryas octopetala*) grows very well also in a rock garden.



Eurasian dwarf cornel (*Cornus suecica*) is showy in the autumn. The American species *C. canadensis* seems to be easier to propagate. Photo credit Pekka Halonen.



Asian globeflower (*Trollius asiaticus*) flowers in late May and early June. It hybridizes easily with the native European species, which need to be taken into account when planting the species in the areas where *T. europaeus* grows wild.

have potential as cultivated trees also in more northern areas of Finland. The big flowered *S. tianschanica* can be seen grown as a street tree even in the Kola Peninsula, Russia. *Sorbus* and *Prunus* species belong to the few ornamental trees with a flourish blooming in the north. Besides native bird cherry (*P. padus*) also Manchurian cherry (*P. maackii*) and pin cherry (*P. pensylvanica*) are hardy.

Of the taller ornamental shrubs thorny serviceberry (*Amelanchier spicata*), Siberian pea-tree (*Caragana sibirica*) and

Hungarian lilac (*Syringa josikaea*) are hardy at least in southern Lapland. In the big genus of willows (*Salix*) there are several potential species for landscaping and restoration. Lapland willow (*S. lapponum*), arctic gray willow (*S. glauca*) and woolly willow (*S. lanata*) are native northern gray leaved willows. Myrtle willow (*S. myrsinites*) has glossy, dark green

leaves. Its decumbent form has been taken into cultivation from Lapland. Native prostrate species are dwarf willows *S. herbacea* and *S. reticulata*. A good ground cover is the new cultivar *S. glauca* var. *callicarpae* 'Haltia'. The species grows wild in arctic Canada and Greenland. Several shrub roses (*Rosa*) thrive well in the north and they are traditional ornamental plants. Scotch rose (*R. spinosissima*) 'Plena' for example is grown in

many old farmyards. Cinnamon rose (*R. majalis*) 'Tornedal' is a local cultivar from western Lapland. Potential species are also included in genera *Spiraea*, honeysuckle (*Lonicera*) and currant (*Ribes*).

Several dwarf shrubs from mat forming alpine azalea (*Loiseleuria procumbens*) and mountain avens (*Dryas octopetala*) to higher species like crystal tea (*Ledum palustre*, syn. *Rhododendron tomentosum*) or leather leaf (*Chamaedaphne calyculata*) grow wild in Finland. Crystal tea with beautiful white

flowers and a strong scent typically grows on bogs. In northern Finland it grows also in heath forests. It, like e.g., another white flowered bog plant leather leaf and some other species, can also be grown as garden plant.

Most of the listed hardy plants for the north are herbs, both introduced ornamentals and native wild plants. Globeflower (*Trollius europaeus*) flowers early in the summer with light yellow flowers. The orange flowered Asian species *T. asiaticus* and *T. altaicus* are introduced to cultivation from the expedition of the Finnish botanical gardens to the Altai Mountains and West Sayan. Columbines (*Aquilegia*) include several valuable species also for northern landscaping. The Siberian species *A. glandulosa* with big blue flowers seems to adapt very well to the northern climate. In Lapland is grown low, early in the summer flowering *A. 'Olympia'*. It has big blue-and-light yellow flowers. Native mat forming cat's foot species *Antennaria dioica* and *A. alpina* grow on dry habitats. Roseroot (*Rhodiola rosea*) sometimes called "northern ginseng" grows wild in the fell area. It is an ornamental rock plant, which is in cultivation nowadays also because of its pharmacological properties.

There is a large variety of native grasses (*Poaceae*), sedges (*Cyperaceae*) and rushes (*Juncaceae*) in northern areas. So far little is known about ornamentals in these families, their use and thriving in northern Finland. Native vernal grass (*Anthoxanthum*) and holy grass (*Hierochloa*) are small fragrant grasses. Three-leaved rush (*Juncus trifidus*) grows on dry and rocky soils in nature. It forms dense tussocks. It like for instance small capitata sedge (*Carex capitata*) can also be grown in the rock garden.

The plants mentioned above are just a few examples of the rather high amount of native Finnish and introduced foreign plants that can be used for landscaping and restoration in northern Finland up to the Arctic Circle and still further north. When the hardy plant list was made in the LABPLANT

subproject the large variety of potential plants was rather a surprise. More research in this field is needed though and more information about the plants and their use should be available to those, who use these plants in northern circumstances. In restoration a problem is the

lack of native plant material. Plant nurseries are few in the north and the market is small. In future projects one aim is to study the possibility to get a common nursery market in northern countries including perhaps Scotland and some other similar areas.

## *Cornell University Claims Ownership of Plants Developed by LPDC at Cornell*

Following an inquiry in 2002 by Mary Hirschfeld of the Cornell Plantations on how Cornell could become more involved with the Landscape Plant Development Center, Dr. Harold Pellett developed a proposal for LPDC and Cornell University as follows: (1) LPDC would provide funding to Cornell to hire a support scientist to carry out the day to day breeding activities; (2) plants growing at the Cornell Plantations would be used as parents; (3) Cornell's greenhouse, field space and laboratories would be used in the project; (4) Cornell would provide some maintenance assistance for the project; and (5) any resulting plant introductions would be co-owned and potential royalties would be shared. However, when the proposal was presented to Cornell's sponsored program administrators, they insisted that a 50% overhead cost would be required. As a small non-profit organization, the LPDC could not afford that added cost.

Dr. Nina Bassuk of the Cornell University Horticulture Department, then proposed that, if LPDC would hire a plant breeder, Cornell would give that person a courtesy appointment as a Visiting Fellow. That arrangement allowed the project to begin in May of 2003 and LPDC hired Peter Podaras to make crosses in accordance with the direction and guidance provided by Dr. Pellett. The Landscape Plant Development Center also provided \$2,000 to Cornell to establish an

account to pay for miscellaneous supplies required in the project activities.

The research was initiated and, following the first season of crossing, most of the time and work was devoted to breeding *Buddleia*, *Weigela* and *Diervilla* in the greenhouse throughout the entire year, and breeding Oaks in the field during the spring and summer.

In 2005, LPDC was shocked to learn that the LPDC account at Cornell was in deficit by nearly \$9,000. The LPDC was being charged for the use of greenhouse and field space, and for part time help on the project. LPDC did pay the additional charges and in fact, provided additional funding to the account. As a result of this additional financial input required of LPDC, Cornell was notified that the ownership of any plant introductions and proposed sharing of potential royalties would need to be changed to reflect the shift in additional costs to LPDC. In an attempt to formalize the project, the original proposal was sent to Dr. Richard Cahoon in Cornell's Office of Technology Transfer and Economic Development. In addition, Dr. Pellett informed Dr. Cahoon that the proposed sharing of the project's results needed to be altered to reflect the increased financial support now provided by LPDC, and that this is a change

in the distribution of inputs from that originally proposed. An email from Dr. Cahoon stated that he would have his assistant arrange a meeting to work out the details of the revised proposal. That meeting was never scheduled. Additional costs and high fees continued to be charged to, and paid for, by LPDC. This included \$1,700 annually for 0.37 acre for use of the field space at Cornell University. Therefore, use of field space was held to a minimum and subsequently, all field plants were propagated and re-established at other LPDC locations. All use of field space at Cornell was eventually eliminated.

In addition to growing field plants at LPDC's sites in Oregon and Minnesota, the Center also contracted with a grower in Maryland in 2007 to grow a large population of hybrid *Buddleia* plants for the project. In October 2007, Peter Podaras and Dr. Pellett made selections and collected cuttings of promising individual *Buddleia* plants at the Maryland site. Those plants were propagated by Peter in the greenhouses at Cornell, again, all of which was funded by LPDC.

During 2007, Dr. Nina Bassuk, of the Cornell University Horticulture Department, Dr. Don

Rakow, Director of the Cornell Plantations, and Dr. Harold Pellett, Executive Director of LPDC, once again worked on developing a document to formalize the cooperative work on this plant breeding project, and to work out an agreeable format for ownership of any plant introductions, and for sharing of potential royalties based on the relative input by the two institutions. The document that was agreed upon stated that the majority of plants should belong to LPDC since it had provided the out-of-pocket costs for the project and has taken all of the risks. Plants developed from use of Oak parent plants at the Cornell Plantations and for which Cornell had provided some of the greenhouse costs and some direction for the project would be jointly owned. The potential royalties from this part of the project would also be shared based on the relative input by the two institutions.

During the breeding effort with *Diervilla*, a variegated mutant was discovered in one of the seedlings. This plant was propagated and evaluated at several LPDC locations. It proved to be a stable mutant and the decision was made by LPDC to introduce the plant. This mutant plant fit the category wherein LPDC had provided the costs for development, and therefore belonged to LPDC in accordance with the discussions for the revised agreement. LPDC subsequently licensed Bailey Nurseries, Inc. to produce and market the plant. LPDC patented and trademarked the plant under the name of Cool Splash. Bailey Nurseries is working through the Novalis group of growers and production of the plant is in progress. Plans are in place to market and sell the plant in 2009.

The document that was developed and agreed upon by LPDC and the involved Cornell staff was presented to Dr. Richard Cahoon, Director of Cornell Center for Technology Enterprise and Commercialization. A telephone conference to approve the agreement was scheduled and held on March 12, 2008. At that conference, LPDC received another major shock and setback, wherein Dr. Richard Cahoon stated that Cornell has a policy stating that Cornell owns all intellectual property rights of developments made by anyone with a Cornell appointment even if the person was not paid by Cornell and was hired by another institution. This was the first notification that LPDC ever received about such a policy. LPDC did not, and would never agree to such a policy, particularly relative of the existing inequality of inputs to this LPDC project. This Cornell policy, whether new or old, is a major problem and setback to LPDC in light of the fact that LPDC has invested over \$250,000 in this significant plant breeding project.

Following the March 12, 2008 Cornell announcement, LPDC has made many attempts to negotiate a reasonable settlement without success. Dr. Alan Paa, Cornell's Vice Provost for Technology Transfer and Economic Development, now asserts that Cornell University owns the rights to all plants that Peter Podaras had any involvement in developing since he had a "courtesy appointment" at Cornell as a visiting fellow, and that Cornell facilities were used, even though LPDC totally paid for their use. Also, LPDC has been denied access to any of the plant material that resided in Cornell's greenhouses at the time of the March 12, 2008 telephone conference. This plant material

includes plants that Dr. Pellett provided major direction on, as well as actual work on the plants; plus, much of the development work on these plant selections was done at other locations. In spite of all of these facts, Cornell still insists that it has sole ownership of these LPDC developed plants.

Following the March 12, conference, Dr. Pellett instructed Peter to continue in accordance with previous plans which required Peter to send cuttings of the *Buddleia* selections that were made in Maryland to LPDC's Oregon station, to Dr. Pellett in Minnesota, and to nurseries with which LPDC had made arrangements for evaluation of the plant materials. Peter refused to send the cuttings and refused to talk with Dr. Pellett after that time. It also became apparent that Peter wanted Cornell to have ownership of the plants since their policy states that inventors receive a share of the royalties. This resulted in the termination of the LPDC contract with Peter Podaras, thereby taking him out of the breeding project. Cornell has since hired Peter to continue breeding work with the plant materials developed by LPDC at Cornell. However, LPDC has not consented to Cornell's use of any of the LPDC plant material.

At present, discussions with Cornell continue. LPDC has retained the law firm of Finnegan, Henderson, Farabow, Garrett and Dunner to represent LPDC. They are a large well known law firm that specializes in intellectual property rights. They are representing LPDC on a pro-bono basis because the Center is a small, non-profit organization with limited funds, and because they do not think that Cornell has a valid claim to ownership of the plants that were developed.

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