

Research in the Georgeson Botanical Garden

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Thirteen years ago, a handful of people dared to dream about developing a botanical garden for Alaska. The result of a few rather unorganized meetings was the Georgeson Botanical Garden, located on the grounds of the Agricultural and Forestry Experiment Station's Fairbanks Experiment Farm. The underpinning of this garden is new and innovative horticultural research cloaked in spectacular displays of flowers, perennials, vegetables, and herbs. What has transpired is a public garden where visitors from all over the world become an active component of research and education in subarctic horticulture.

The Flower Trials

Few visitors realize the annual flower display gardens are an outdoor laboratory to evaluate new and interesting species and cultivars of flowers for home and commercial landscapes. Data are collected on more than 300 flowers annually. The data provide information on growth habit, flowering period, disease and insect pest problems, and adaptability to a short, cool growing season with day lengths approaching 24 hours. We compile lists of flowers that provide early season color, those that bloom nonstop all summer long, and those that thrive even after a killing frost. We compare growth statistics with published information, to provide



Cosmos 'Sensation' mix.

Photo courtesy of the Georgeson Botanical Garden Collection



*Photo courtesy of the Georgeson Botanical Garden Collection,
#GB66-6-18*

more accurate cultural information than that found in catalogs.

For instance, a flowering amaranth variety called Elephant Head was described in catalogs as a five-foot giant, but in Fairbanks, it bloomed and reached a maximum height of two feet. Violas, on the other hand, normally have published heights of six to eight inches at lower latitudes. In Fairbanks, plants form billowy masses of color often two feet in height and spread. Flowers such as celosia, impatiens, and vinca are not good candidates for Alaska's cool soil conditions, but many garden favorites such as pansies, calendulas, sunflowers, and snapdragons grow well.

Prior to the development of the botanical garden, the grounds consisted of field plots laid out each spring. The planting design and bed rotation varied each year, and this process helped to minimize a serious flower disease. With development of the botanical garden came permanent flower beds and a steady increase in damage caused by cottony rot, *Sclerotinia sclerotiorum*.



Children's pond.

Photo courtesy of the Georgeson Botanical Garden Collection

This disease attacks a variety of flowers, especially petunias. The plants look like they were killed by a frost in midseason. The disease can completely devastate a garden if not treated. Early research showed that petunia cultivars differed in their susceptibility to *Sclerotinia*, but cultivars change so rapidly from year to year that selection for tolerant or resistant varieties is not practical.

We conducted three years of trials with a biological control agent, *Trichoderma* sp., a soil fungus that attacks the disease. Although there was some delay in the onset of the disease, the plants still died. Dr. Roseann Leiner, horticulturist in Palmer, is studying other biological control measures that may provide a solution to a serious garden problem.

One of the favorite old-fashioned garden flowers in the Fairbanks area is cosmos. Some cosmos cultivars bloom by the first week of July, but many are very late or don't bloom at all. One reason for this late blooming habit is that flowering is controlled by the number of hours of darkness plants are exposed to early in the season. Many cosmos require a minimum of 15 hours of darkness every day for two weeks in order to set flower buds. This is not a strict requirement for all cultivars because some eventually bloom, but others like 'Yellow Garden' cosmos will not bloom at all without the dark treatment.

We experimented with providing a darkness pretreatment while the plants were still seedlings in the greenhouse. If the dark treatment was given during the first two weeks of germination and seedling growth, the seedlings were thin, spindly and difficult to transplant. If the treatment was given the last two weeks in the greenhouse, seedlings were more robust and trans-

planted easily. Both dark treatments promoted flower bud development. Flowering began four to six weeks earlier in dark-treated plants than in plants growing under natural day length.

We also found that a dark treatment of as little as eight days set flower buds and provided season-long color (rather than just late-season) in the garden. Home gardeners can get the same results by moving flats of cosmos into and out of a dark closet each day. Commercial growers of field-grown cut flowers can extend the flower production and cutting season by at least four weeks with the dark pretreatment.

The Family Food Garden

The family food garden contains examples of nearly all the different kinds of vegetables, herbs, and fruit crops hardy in Alaska's Interior. Replicated variety trials are conducted on specific vegetables based on requests from commercial businesses. For the past five years we have conducted trials of red cabbage,



'Melody' spinach.

Photo courtesy of the Georgeson Botanical Garden Collection, #RP-DSC-1-15



Raised bed.

Photo courtesy of the Georgeson Botanical Garden Collection, #GBG6-27-1

broccoli, spinach, and carrots for Denali Seed Co., Anchorage. The most challenging of these is spinach which bolts four to five weeks after spring sowing. Our trials did not yield any cultivar that was more resistant to bolting than others, but ‘Melody’ and ‘Tyee’ were rated highest on appearance and taste. These cultivars are savoy type (crinkly leaves) spinach. The cultivars that ranked lower were the smooth leaf types: ‘Teton’, ‘Medania’, ‘Grodane’, and ‘Hybrid 457’.

Most gardeners in the Interior would love to grow vine-ripened beefsteak tomatoes, but our short growing season and cool temperatures preclude the cultivation of most varieties except in greenhouses. Despite the fact that outdoor tomatoes are difficult to mature, Territorial Seed Co., Oregon, sells more tomato seeds to Alaskans than just about any other vegetable! During the summers of 2000 and 2001, we tested several cultivars of tomatoes from Territorial Seed and compared them with our locally bred ‘Subarctic 25’ tomato. The summer of 2000 was so cold and rainy, no tomatoes matured, not even ‘Subarctic 25’. In 2001, all cultivars bore fruit, and two surpassed ‘Subarctic 25’ in size. ‘Prairie Fire’, with two-inch diameter fruit, outweighed ‘Subarctic 25’ by more than three times, but the total yield was the same (3.6 lb per plant). It matured one to two weeks later than ‘Subarctic 25’. ‘Northern Delight’ produced fruit that was generally larger than ‘Subarctic 25’ and yielded 3.9 lb per plant. Although these cultivars have little commercial importance, they will add variety to home gardens throughout the Interior. Cultivars that did not quite measure up included: ‘Oregon 11’, ‘Glacier’, ‘Kootenai’, ‘Stupice’, and ‘Moskvich’.

Gardeners with limited mobility have followed the progress of our raised bed gardens. Each raised bed has 75 square feet of growing space. One garden is 27 inches high to accommodate chairs and wheelchairs. The second bed is 35 inches high for gardeners who prefer to stand, who may need crutches or cannot bend or kneel. The gardens are designed to provide fresh vegetables in summer and help people with limited mobility enjoy America’s most popular leisure activity—gardening! We weighed the produce harvested from these beds, and it totaled nearly 46 lbs during the first season (Table 1).



Tomato trials.

Photo courtesy of the Georgeson Botanical Garden Collection

Table 1: Yield of fresh vegetables and herbs from accessible raised beds

Crop	Yield (lb)
Radish.....	0.7
Leaf lettuce.....	6.5
Turnips.....	2.4
Cauliflower.....	3.2
Parsley.....	0.8
Herbs (basil, thyme, sage).....	0.9
Zucchini.....	5.8
Carrots.....	0.7
Broccoli.....	0.8
Cabbage.....	11.5
Kohlrabi.....	0.9
Spinach.....	0.4
Beets and greens.....	4.9
Wax beans.....	0.5
Celery.....	4.0
Green beans.....	0.7
Tomatoes.....	0.8

Table 2: Rose trials at the GBG

Recommended rose species and cultivars

<i>Rosa acicularis</i>	Prickly rose, native, woodland gardens
<i>Rosa rugosa</i>	Japanese rose, rugosa rose
<i>Rosa rugosa</i> 'Rubra'	Rugosa rose with dark red flowers
<i>Rosa rugosa</i> 'Alba'	Rugosa rose with white flowers
<i>Rosa rugosa</i> 'Albo Plena'	
<i>Rosa spinosissima</i> 'Altaica'	Altai Scotch rose
<i>Rosa</i> sp. 'Hansa'	<i>R. rugosa</i> hybrid
'Killwinning'	
'Lac La Nonne'	<i>R. rugosa</i> x <i>R. acicularis</i> hybrid
'Lac Majeau'	<i>R. rugosa</i> x <i>R. acicularis</i> hybrid
'Prairie Wren'	
'Therese Bugnet'	<i>R. acicularis</i> x <i>R. rugosa</i> hybrid

Not Recommended

<i>Rosa canina</i>	Dog rose, hardy but invasive
<i>Rosa chinensis</i>	'Angel Wings'
<i>Rosa Eglanteria</i>	Eglantine rose
<i>Rosa multiflora</i>	
<i>Rosa rubrifolia</i>	
<i>Rosa woodsii</i>	Wood's rose, hardy but invasive

<i>Rosa</i> sp. 'Agnes'	<i>R. rugosa</i> hybrid
'Morden Centennial'	
'Morden Fireglow'	
'Morden Ruby'	
'Topaz Jewel'	<i>R. rugosa</i> hybrid

Currently being tested

<i>Rosa rugosa germanica</i>	
<i>Rosa</i> sp.	
'Assiniboine'	
'Carefree Sunshine'	
'Charles Albanel'	<i>R. rugosa</i> seedling
'David Thompson'	Canadian Explorer Series
'Dwarf Pavement'	<i>R. rugosa</i> hybrid
'F.J. Grootendorst'	<i>R. rugosa</i> hybrid
'Foxi Pavement'	<i>R. rugosa</i> hybrid
'Hazeldeen'	
'Henry Hudson'	Canadian Explorer Series
'Jens Munk'	Canadian Explorer Series
'Knockout'	
'Martin Frobisher'	Canadian Explorer Series
'Persian Yellow'	<i>R. foetida</i>
'Rose a Parfum de l'Hay'	<i>R. rugosa</i> x Perpetual hybrid
'Sir Thomas Lipton'	<i>R. rugosa</i> x Polyantha hybrid
'Snow Pavement'	<i>R. rugosa</i> hybrid
'Wasagaming'	<i>R. acicularis</i> x <i>R. rugosa</i> hybrid
'William Baffin'	Canadian Explorer Series

Perennial trials

If we could choose only one group of ornamentals to grow and evaluate in the perennial trial plots, it would be roses. More gardeners request information about hardy roses than any other perennial ornamental. During the past ten years, nearly 50 rose species and cultivars have been evaluated for cold hardiness, flowering, fragrance, suckering habit, and moose browse potential (Table 2).

Our trials have shown that all shrub roses will exhibit stem dieback from winter injury in some years, but especially in the first four years following planting. However, many recover from buds protected by snow and provide spectacular annual displays of fragrant flowers.

Annual pruning of dead canes should be expected even on the hardiest cultivars. All roses are moose food, even the common Rugosa rose which is covered with tough thorns. Many of the hardiest roses also sucker freely and will easily grow beneath six-inch lawn edgings and other barriers. They should be planted in areas where they can spread freely.

Although the public enjoys walking around the botanical garden, sitting on a park bench on a sunny day, painting pictures and visiting with friends, there certainly is more to the garden than meets the eye. Every corner of the garden is full of experiments and plant trials designed to increase our knowledge of subarctic horticulture. Visitors help by sharing information about new plants and cultivation techniques. Many take the time to help us evaluate plants and produce. Their comments provide ideas and information for developing research projects for many years to come.



Rosa 'Prairie Wren,' a white rose.
 Photo courtesy of the Georgeson Botanical Garden Collection.