

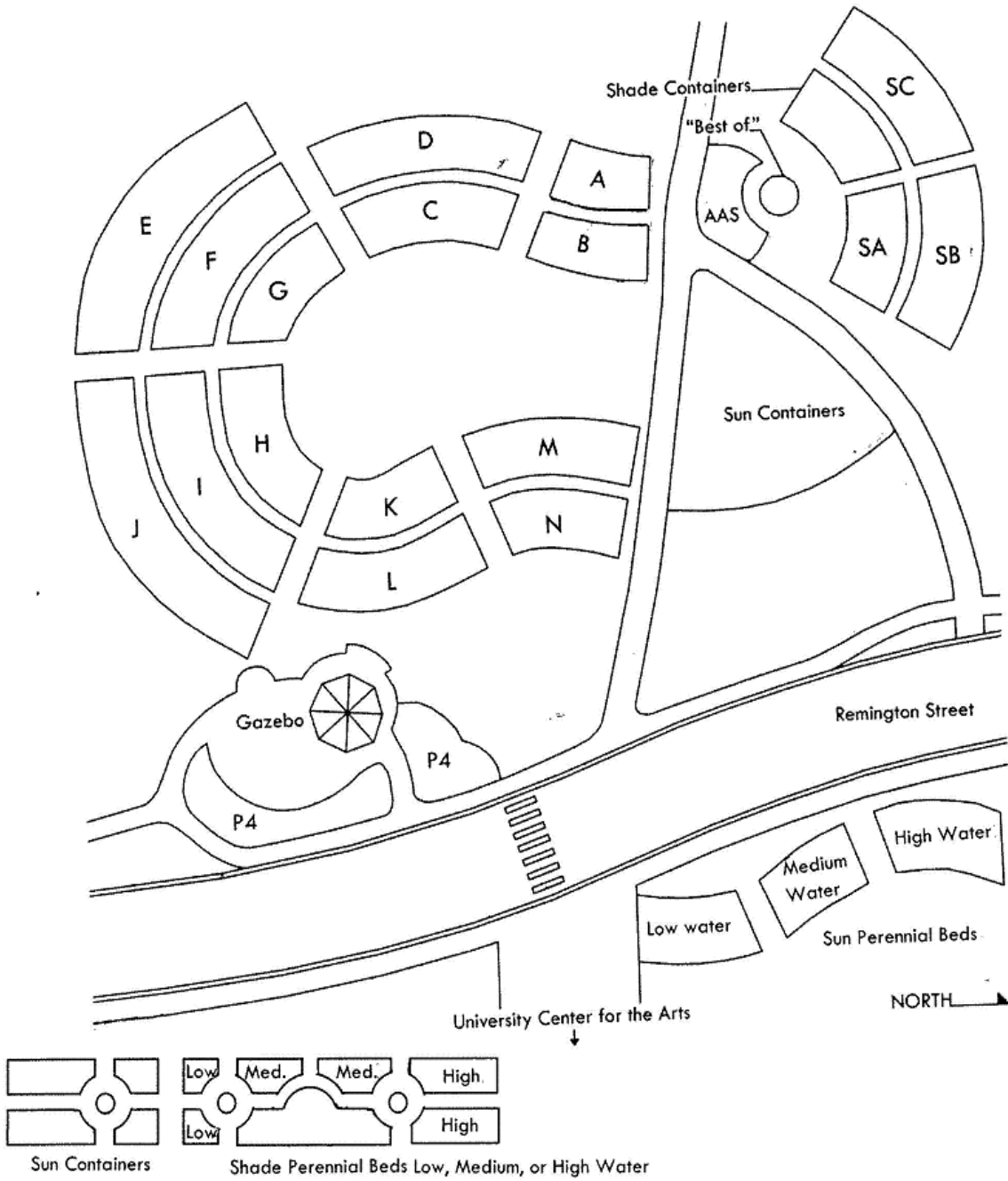
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GARDEN MAP



- Note: The Perennial Trials are part of the Annual Flower Trial Garden program and are located directly across the street in front of the new Center for the Arts.

Colorado State University

2011 Perennial Trial Garden

Performance Report

Dr. James E. Klett, Eric Hammond and David Staats

Introduction

The W. D. Holley Plant Environmental Research Center (PERC) on the Colorado State University campus has been in operation for 39 years. Dr. James E. Klett is the Director of PERC and the faculty coordinator for the Annual and Perennial Flower Trial Gardens. In 2000, the trial garden was moved from its site at PERC to the park located on Remington and Lake Streets. The relocation of the garden to this more spacious and visible site furthered its mission by more effectively extending education, research and outreach to students, home gardeners, Master Gardeners, community members and Green Industry personnel. In 2007, the Perennial Trials were created in response to increased interest in new perennial cultivars. The Perennial Trials are located directly across the street to the east from the Annual Trial Garden in front of the University Center for the Arts. It is managed by staff from the CSU Department of Horticulture and Landscape Architecture with substantial oversight from the Perennial Trial subcommittee which is part of the Annual Flower Trial Garden committee. Each entry must have been introduced within the past three years and is evaluated for two complete years to determine hardiness and consistent landscape performance.

The outdoor display and test areas at PERC were established to allow students, researchers, industry representatives, homeowners and extension personnel to learn, teach and evaluate horticultural research and demonstration projects in the Rocky Mountain/High Plains region. The gardens are open to students, industry personnel and the public for viewing, gathering ideas about new varieties, studying the different growth habits, tolerances and visual characteristics of many perennial plant cultivars.

The purpose of the trial garden is to evaluate the performance of perennial plant cultivars under our unique Rocky Mountain environmental conditions. Our growing conditions are characterized by high altitude, intense solar radiation, drying winds, severe hailstorms, large fluctuations between day and night temperatures and a season-long need for irrigation. Plants are evaluated for plant vigor, uniformity, floriferousness and tolerance to environmental and biotic stresses. Data (ratings and photos) were collected every two weeks (May to early October). Plants were evaluated once a month by members of the Perennial Trial subcommittee. The Perennial Trial subcommittee met in November to review data and photos to vote on which entries should be designated a "Top Performer".

The project is funded, in most part, by the entry fees collected from the plant breeding companies and perennial propagators who have chosen to participate in the trials. Additional financial assistance and supplies for the trial operations are donated by a number of sources. These sources include various foundations, nurseries, greenhouse growers and plant and seed production companies from across the

nation. The trial garden at Colorado State University receives no operating dollars directly allocated from state funds. Some operational and staff dollars have come from the Colorado State Agricultural Experiment Station, Extension, the College of Agricultural Sciences and the Department of Horticulture and Landscape Architecture.

Acknowledgements

The Department of Horticulture and Landscape Architecture at Colorado State University would first like to thank the many plant and seed companies who continue to participate in the trials year after year. Without their cooperation and support, the research done at the trial garden would not be possible. This year, the following 13 plant and seed companies participated in the trials, entering 114 varieties of herbaceous perennial plants:

American Takii	Kieft-Pro-Seeds
Blooms of Bressingham	McGregor Plant Sales
Center Greenhouse	Pacific Plug and Liner
Conard-Pyle Co.	Proven Winners
Creek Hill	Skagit Gardens
Darwin Perennials	Walters Gardens
Eason Horticultural Resources	

We would like to recognize several companies that have donated supplies to the program. Thanks are extended to Green Care Fertilizers, Inc. for donating the water soluble fertilizer used in both the greenhouses and the garden. We would like to thank Sun Gro Horticulture, Inc. for donating the potting media for all the vegetatively propagated plants grown in our greenhouses. And thank you to Scotts-Sierra for donating the slow release fertilizer that was also used in the ground beds.

We would like to thank our Annual Trial Garden Advisory Committee for their constant advice and feedback on the overall operation of the trials. We are fortunate to have such a diverse group of industry leaders that are willing to volunteer their time for the benefit of our program. Our committee is comprised of the following individuals:

Harvey Lang (Syngenta Flowers), Celia Tannehill, Danny Brooks (Benary Seed), Dan Gerace (Welby Gardens), Al Gerace (Welby Gardens), Diana Reavis (Eason Horticultural Resources Inc.), Duane Sinning, Eric Pitzen (Syngenta Flowers), Frank Yantorno (Center Greenhouse, Inc.), Galen Dokter (Syngenta), Gary Douglas (Denver City Park Greenhouse), Gene Pielin (Gulley Greenhouse), Jim Devereux (Michell's), John Williams (Tagawa Greenhouses), Karl Trellinger (Syngenta Flowers), Keith Stieduhar (City of Westminster), Maria Bumgarner (Denver Botanic Gardens), Mark Sanford (S&G Flowers), Mark Seguin (Sakata), Merle Moore (retired, Denver Zoological Gardens), Paul Hammer (Dummen USA), Ron Brum (Ball Horticultural Company), Ross Shrigley (Denver Botanic Gardens), Lida Sladkova (Fides NA), Luke Ellington, (Express Seed Company), Susan Stauber (Ball Horticultural Company), Wayne Pianta (PanAmerican Seed)

And a special thanks to those who served on the Perennial Trial Sub-Committee.

Celia Tannehill, Dan Gerace (Welby Gardens), Diana Reavis (Eason Horticultural Resources Inc.), Galen Dokter (Syngenta), Gary Douglas (Denver City Park Greenhouse), Gene Pielin (Gulley Greenhouse), Maria Bumgarner (Denver Botanic Gardens) Merle Moore (retired, Denver Zoological Gardens), Ron Brum (Ball Horticultural Company) and Ross Shrigley (Denver Botanic Gardens).

Perhaps most importantly, much thanks and appreciation goes to the PERC staff at the university that has worked diligently to prepare and maintain the garden. These people include:

Horticulture Research Associate	David Staats
Graduate Trial Garden Staff	Eric Hammond
Undergraduate Trial Garden Staff	Jaclyn Salts Cullen McGovern Sarah Shaub Patrick Sorteberg Tanner Williams Caitlin Nase
Undergraduate PERC Staff	Sean Powell

For further information on the Annual and Perennial Flower Trial Garden at Colorado State University, feel free to write, call or e-mail:

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This report is also available online at:

www.flowertrials.colostate.edu

(Click on "Trials" tab and select "Perennial Results")

Cultural Data¹

Growing

All perennial seeds were sent to Welby Gardens in Denver, CO in January and February 2011 for germination and growing-on in their greenhouses in 3.5" jumbo 4-cell packs. Seed grown varieties were all received on June 7th and planted in the garden shortly thereafter. Vegetative propagated plants did not arrive all at the same time or the same growth stage. Most of the new entries were planted in the garden in early June although one company sent a second shipment that was planted in August (noted in the comment section for the appropriate plant). Some vegetative varieties were received as plugs and transplanted into 4.5" pots shortly after arriving at Colorado State University. They were planted into the garden when they filled a 4.5" pot. Some entries arrived in larger containers and were planted directly into the garden.

Fertilization in the Greenhouses

Dosatron[®] fertilizer injectors rated at 7 GPM were used in the greenhouses to fertilize plants each day they were watered, with the exception of being watered every weekend with clear water. Greencare 14-4-14 water soluble fertilizer was used. All plants were grown in the greenhouses at PERC. They received fertilization at a rate of 200ppm.

Chemicals Used in the Greenhouses

Banrot[®] (6 oz/gallon) and Rootshield[®] (0.5 tsp/gallon) was applied to all plugs immediately after arrival and prior to potting. A drench of 6 oz/gallon was delivered to each variety.

Other chemical treatments that were applied in the greenhouse are as follows:

May 4th: Insecticidal soap was applied for aphids.

Soil Amendments and Preparation

All beds were raked clean of old mulch, dead plant material and weeds prior to planting.

Planting

Plants are grown in highly amended beds (see soil analysis table). Entries were planted in beds that corresponded with their preferred moisture and sun or shade requirements. Beds are fertilized (see fertilization section for details) and tilled prior to planting new varieties.

Bed Spacing

Entries were planted in the ground based on estimated mature plant size and how many were sent. Generally, plants were spaced at one foot centers with two rows of ten plants each. If fewer plants

¹ No endorsement of products named is intended nor is criticism of products not mentioned.

were sent they may have been planted at wider spacing or in just one row instead of two. There were approximately two feet between entries.

Watering

All beds in the garden were zoned according to weekly water-use requirements of 0.5", 1.0" and 1.5" of water per week. Plants were placed in beds that matched their relative water needs. An irrigation audit was conducted at the beginning of the season to determine the irrigation rate per bed. This rate, along with the bed's water-use rating, was used to calculate the total length of time to irrigate each bed. Because of variable precipitation and the need to establish newly planted varieties, the irrigation was sometimes adjusted as needed to make sure plants were not stressed. During the winter, plants are watered by hose and sprinkler as needed during dry spells

Fertilization in the Garden

After planting, Osmocote® (14-14-14) was applied to all beds at the rate of 10 grams/sq. ft. (suggested medium rate on label). Greencare water soluble fertilizer (20-10-20) was dispensed through a 100 GPM Dosatron® twice a week at a rate of 150 ppm.

Maintenance of Flowers

All flowers were deadheaded as needed. After a killing frost in the fall, plants are cut back to the ground unless they have winter interest.

Weed Control

RoundUp® was applied as a spot treatment to control encroaching grass around the edges of the beds on June 22nd and July 11th. Otherwise, all weeding was done by hand throughout the season.

Pest Control in Garden

Malathion at a rate of 8 tblsp/gallon was applied to control leafhoppers on June 28th and July 7th.

Disease Control in Garden

Powdery mildew was a problem on several varieties late in the summer and it was noted in the comment section of the following tables. Rust was also an issue on some *Phlox* varieties. No chemical control was used in either case since it was important to evaluate the entries in garden conditions typically found in this region.

Entries That Failed to Overwinter

There are a couple of entries that had extreme winter losses but if any plants emerged in the Spring it was included in the data even if it died out later. Some entries that completely failed to survive the winter of 2010/2011 are listed here instead of in the following tables. The entry from 2009 that failed to survive the 2010/2011 winter is: *Antirrhinum* 'Eternal'. The entries from 2010 that failed to survive the 2010/2011 winter are: *Alcea rosea annua* 'Spring Celebrities™ Carmine-Rose', *Alcea rosea annua* 'Spring Celebrities™ Lemon', *Coreopsis* 'Sweet Marmalade', *Hebe hybrid* 'Raspberry Ripple', *Hebe hybrid* 'Strawberries and Cream', *Phygelius* 'Pheeges™ Lemon Frost', and *Salvia buchanani* 'Wendy's Wish'.

Dates of Severe Weather

This summer consisted of a mild May with regular rains in June and July. June 8th, the garden suffered a moderate hail storm (pea size) causing moderate damage to the trials. Varieties damaged by hail are noted as such in a column next to their name in the inventory that follows in this book. This past August was also one of the hottest Augusts on record for Colorado due to a couple of weeks with highs reaching into the 90s.

Monthly Temperatures and Precipitation for Summer 2011

Month	Avg. Maximum Temperature	Avg. Minimum Temperature	Precipitation (Inches)
May (24 th – 31 st)	66.3° F	46.6° F	0.55
June	82.4° F	52.5° F	2.78
July	89.2° F	60.4° F	1.70
August	89.8° F	58.8° F	1.60
September	76.8° F	48.6° F	1.33

*Weather information for the Annual Flower Trial Garden area provided by the Department of Atmospheric Science at Colorado State University: <http://ccc.atmos.colostate.edu/>

Data Collection Methods

Plant Size

Height and width measurements were taken once in September, toward the end of the growing season. This was done to get a feel for the average size of the mature plants and each variety's growth performance. For consistency in bed data collection, the third plant from the front of the left row was measured; however, if that plant was noticeably smaller or larger than average, an alternate plant was selected for measurement. Measurements were taken at the highest and widest parts of the plant, including any flowers.

Soil Samples

Soil samples were taken from individual ground beds on June 20th, July 20th and August 23th and were combined into a single sample per category for each bed.

Soil Analysis

Month	PH	E.C. mmhos/ cm	Lime Estimate	% O.M.	NO ₃ - N	P	K	Zn	Fe	Mn	Cu	Texture
Sun 6/20/11	6.6	0.5	Low	15.0	50.9	232	581	33.2	194	8.2	5.0	Sandy Loam
Sun 7/20/11	7.2	0.7	High	12.4	78.3	153	338	21.3	116	5.3	8.4	Loam
Sun 8/23/11	6.8	1.4	Low	13.5	236	120	207	12.3	75.4	5.5	3.2	Sandy Loam
Shade 6/20/11	7.0	0.7	Very High	13.2	75.9	224	646	41.4	136	18.0	10.0	Sandy Loam
Shade 7/20/11	7.4	0.8	Very High	10.0	171	202	733	31.9	104	9.8	9.6	Loam
Shade 8/23/11	7.3	0.8	Very High	13.0	48.6	200	353	20.6	81.1	10.2	5.2	Sandy Loam

Performance Evaluation

Photos and data on plants and flowers were collected on a bi-weekly basis from May to early October. Dead plants in the trial were not considered in the bi-weekly evaluation; thus, the ratings given only reflect the live plants. Members from the Perennial Trial subcommittee also came and wrote comments for each plant on at the end of June, July, August and September. Plants and flowers were rated 1-5 using the following scale:

0 = Dead

1 = Poor: Plants are very sick or dying, no flowering

2 = Below Average: Plants are unattractive in some form, i.e. – leggy growth habit, chlorotic or low vigor, flowers are extremely few and occurring sporadically

3 = Average: Plant appearance with growth characteristics that would be expected for the time of season; flowers would be few but uniform across the plants

4 = Good: Plants look attractive (foliage, growth habit, etc.); flowers are blooming strong and showy

5 = Excellent: Plants are very healthy and uniform; flowering is impressive

Selection of “Top Performers”

On November 21, 2011 a conference call was convened with CSU staff and the Perennial Trial Garden Subcommittee. Pictures of entries from 2009 and 2010 were posted to the Perennial Trial website for review. Data from the growing season was compiled and emailed to each evaluator prior to the conference call for review. After discussion and looking at the pictures taken throughout the season, each plant was voted on by each member of the committee as to whether it should be awarded the designation as a “Top Performer”.

“Top Performers” for the 2011 Season

***Echinacea* ‘Mistral’** ^{PP #20498} (**Mistral Coneflower**) – from Pacific Plug and Liner

This floriferous, compact coneflower is a sport of the very popular 'Kim's Knee High'. Growth habit and flowering is very uniform. Its unique flowers open bright pink but mature to an antique shade and lasted for a long season of bloom. Planted in 2009.

***Penstemon* ‘Prairie Twilight’** ^{PP #19893}, (**Prairie Twilight Beard Tongue**) – from Blooms of Bressingham

Strong burgundy stems support lasting tubular lavender flowers with shades of white that contrast excellently with dark green foliage. It made an impressive display of flowers while growing in a low water area. Planted in 2009.

***Penstemon* ‘Red Riding Hood’** ^{PP #18950} (**Red Riding Hood Beard Tongue**) – from Pacific Plug and Liner

This variety had prolific flowering that was a dazzling display of red tubular flowers on long stems. This impressive variety looked good early in the season and the plants had a vigorous and uniform growth habit. Planted in 2009.

***Buddleia davidii* ‘Buzz™’** ^{PPAF} series, (**Buzz™ Butterfly Bush series**) - from Pacific Plug and Liner

The entire ‘Buzz’ series was noted for continual blooming throughout the summer and the compact plants which were about 36”x36”. The range of colors (Blue Violet, Ivory, Pink Purple, Violet and Magenta) was impressive but judges commented that ‘Buzz™ Magenta’ was the most unusual and striking. It was noted that there were no seedlings and didn’t seem invasive. Bred by Thompson & Morgan. Planted in 2010.

***Echinacea* ‘Conekim’** ^{PPAF}, (**Panther Pink™ Coneflower**) - from Conard-Pyle Co.

Floriferous and long lasting blooms provide impressive display of color. Bright pink flowers were 3-4” across and were very showy. Another attractive feature was the compact growth habit (height: 1-2’, width: 2’). Planted in 2010.

***Helenium* ‘Double Trouble’** ^{PP# 18206}, (**Double Trouble Sneezeweed**) - from McGregor Plant Sales

Bright yellow flowers were prolific with a long period of bloom. Blooms were double with 2-3 rows of petals. Evaluators were also impressed that plants had strong stems which didn’t flop despite overhead irrigation. This tall, clump forming perennial would be a good choice for a sunny border. It was bred by Pieter Damen in Hillegom, The Netherlands. Planted 2010.

***Phlox paniculata* ‘Pina Colada’** ^{PP 19968}, (**Pina Colada Perennial Phlox**) - from McGregor Plant Sales

Flowering is robust from early July to early October and the showy blooms have overlapping, pure white petals. Plants were impressive with exceptional dark green foliage and uniform growth habit. It was bred by Jan Verschoor, Holland. Planted in 2010.

***Veronica longifolia* 'First Love'^{PPAF}, (First Love Speedwell)** - from McGregor Plant Sales

Vibrant pink flower spikes are abundant and make a very attractive display. It is an easy to grow perennial with clean green foliage. It was noted for being a good plant for attracting hummingbirds and butterflies. Deadhead for rebloom. Planted in 2010.