

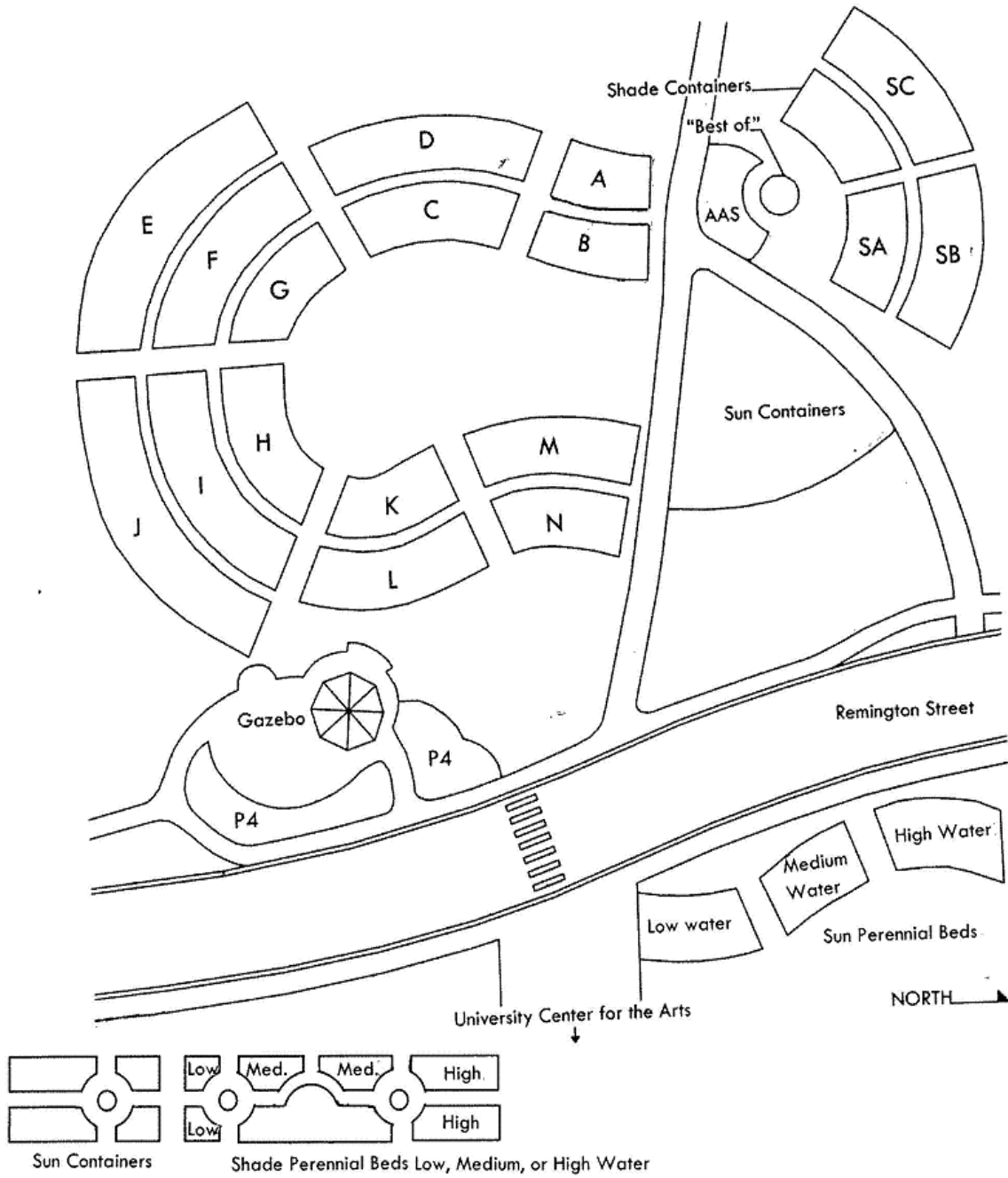
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GARDEN MAP



- 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

2010 Perennial Trial Garden

Performance Report

Dr. James E. Klett and David Staats

Introduction

The W. D. Holley Plant Environmental Research Center (PERC) on the Colorado State University campus has been in operation for 38 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 state horticulture industry associations, 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 16 plant and seed companies participated in the trials, entering 75 varieties of herbaceous perennial plants:

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

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. Thank you to Organix Supply, Inc. for the quick release fertilizer that was applied to the ground beds prior to planting. And thank you to Scotts, Inc. 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:

Paul Hammer (Dummen USA), Ann Hartman-Mahr, Celia Tannehill, Dan Gerace (Welby Gardens), Al Gerace (Welby Gardens), Diana Reavis (Eason Horticultural Resources Inc.), Duane Sinning (Vegetalis/Floranova), Eric Pitzen (Syngenta Flowers), Frank Yantorno (Center Greenhouse, Inc.), Galen Dokter (Syngenta Flowers), Gary Douglas (Denver City Park Greenhouse), Gene Pielin (Gulley Greenhouse), Harvey Lang (Syngenta Flowers), Jim Devereux (Henry F. 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 (Syngenta Flowers), Merle Moore (retired, Denver Zoological Gardens), Ron Brum (Ball Seed), Ross Shrigley (Denver Botanic Gardens), Stefan Reiner (Selecta First Class), Susan Stauber (Ball Seed), Brian Austin (Dutch Heritage Gardens),

Danielle Goris (Country Fair Garden Center), Danny Brooks (Benary Seed), Luke Ellington (Express Seed Company), Jennifer Sheldon (Color Star Growers), Lida Sladkova (Fides NA) and 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.), Eric Pitzen (Syngenta Flowers) Galen Dokter (Syngenta), Gary Douglas (Denver City Park Greenhouse), Gene Pielin (Gulley Greenhouse), Keith Stieduhar (City of Westminster), Maria Bumgarner (Denver Botanic Gardens) Merle Moore (retired, Denver Zoological Gardens), Ross Shrigley (Denver Botanic Gardens) and Susan Stauber (Ball Seed).

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	Rich Guggenheim
Undergraduate Trial Garden Staff	Shelby Collins Jaclyn Salts Phil Waggoner Daniel Way Guy Kuntz Caitlin Nase
Undergraduate PERC Staff	Moises Haro

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

Cultural Data¹

Growing

All perennial seeds were sent to Welby Gardens in Denver, CO in January and February 2010 for germination and growing-on in their greenhouses in 3.5" jumbo 4-cell packs. Seed grown varieties were all received on June 9th and planted in the garden shortly thereafter. Vegetative propagated plants did not arrive all at the same time or the same growth stage. See "Comment" section in the following report for specific planting times for 2010 entries. 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. They received fertilization at a rate of 200ppm.

Chemicals Used in the Greenhouses

Banrot[®] 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 12th: Marathon II[®], Avid[®] and Keyplex 350[®] were applied for aphids.

Soil Amendments and Preparation

All beds were raked clean of old mulch, planting material and weeds prior to planting. Where necessary, RoundUp[®] was sprayed on weeds.

Planting

Plants are grown in highly amended beds (see soil analysis table). In 2010, new beds were created that provided areas of shade and partial shade due to the proximity of nearby trees. Entries were planted in beds that corresponded with their preferred sun or shade requirements. Some entries were transplanted in 2010 to the beds with less sun if it was determined they might benefit from a shadier location or a more appropriate irrigation regime. Entries that were transplanted were noted as such in the comments section in the following tables. Beds are fertilized (see fertilization section for details) and roto-tilled prior to planting new varieties.

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

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 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.

Fertilization in the Garden

All beds were top-dressed with Pro Rich[®] Fertilizer (14-5-5) at the rate of 1 pound N per 1000 square feet prior to planting. 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 in late June and again in late July. After a killing frost in the fall, plants are cut back to the ground. Plants are watered by hose and sprinkler as needed during dry spells throughout the winter.

Weed Control

RoundUp[®] was applied to all beds prior to tilling in the spring, as well as a spot treatment around the edges of the beds on June 29 and July 23. Otherwise, all weeding was done by hand throughout the season.

Pest Control in Garden

July 26th – Oenothera were sprayed for flea beetles with a mixture of Marathon II[®] at 0.5 ml/gallon and Pyreth-It[®] at 0.5 tsp/gallon.

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. The *Alcea* entries had a serious problem with rust which greatly affected their appearance. No chemical control was used 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 were planted in 2009 failed to survive the winter of 2009/2010 and are listed here instead of in the following tables. The entries from 2009 that failed to survive the winter are: *Coreopsis* 'Golden Dream', *Coreopsis* 'Sun Dancer', *Euphorbia* 'Glacier Blue', *Lavandula* '587', *Lavandula toechas* 'Anouk', *Leonotis* 'Savannah Sunset', *Salvia* 'Ultra Violet', *Salvia greggi* 'Icing Sugar', *Santolina* 'Lemon Fizz' and *Verbena* 'Radveib Sweet Thing'.

Dates of Severe Weather

The weather has been fairly typical for Colorado but a little drier than normal in July thru September. There was no significant incidence of severe weather in the 2010 growing season.

Monthly Temperatures and Precipitation for Summer 2010

Month	Avg. Maximum Temperature	Avg. Minimum Temperature	Precipitation (Inches)
May	67.7° F	42.2° F	2.13
June	81.7° F	54.7° F	1.96
July	88.3° F	58.1° F	1.26
August	87.0° F	58.0° F	1.23
September	81.9° F	47.7° F	0.06
October	67.8° F	40.3° F	0.87

*Weather information for the Fort Collins area provided by the Colorado State University at: <http://ccc.atmos.colostate.edu/cgi-bin/summary.pl>

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 28th, July 23rd and August 26th 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 6/28/10	7.0	0.6	Very High	21.7	29.8	93.6	355	23.8	129	8.6	4.8	Loam
Sun 7/23/10	6.9	1.3	Very High	12.3	174	74.8	481	19.8	119	5.4	6.0	Loam
Sun 8/23/10	6.8	1.0	High	21.3	206	209	407	29.9	139	9.0	5.1	Loam
Shade 6/28/10	7.3	0.5	Very High	23.4	13.8	111	740	31.4	114	13.0	10.0	Loam
Shade 7/23/10	7.4	0.6	Very High	23.3	32.2	81.0	815	33.0	101	7.2	7.7	Loam
Shade 8/23/10	7.2	0.9	Very High	23.3	137	221	821	29.1	112	13.6	9.8	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 29, 2010 a conference call was convened with CSU staff and the Perennial Trial Garden Subcommittee. Pictures of entries from 2008 and 2009 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 2010 Season

Anemone ‘Little Princess’ – from Blooms of Bressingham

Large pink and white flowers develop from low growing, compact foliage. This variety performs best in full sun and blooms later in the summer. Planted in 2008.

Hemerocallis ‘Fire King’ - from Walter’s Gardens

This variety had exceptional vigor and strong blooming. Sturdy stalks supported vibrant red-orange blooms to create a spectacular show. Planted in 2008.

Hibiscus ‘Jazzberry Jam’ – from Walter’s Gardens

The vigorous habit of this plant prevailed in both sun and shade trial locations. Attractive, large blooms emerged slightly later in the season than ‘Summer Storm’. Planted in 2008.

Hibiscus ‘Summer Storm’ – from Walters Gardens

A standout variety with attractive dissected foliage emerging dark purple and then maturing to green. This vigorous plant also exhibited good flowering in both sun and shade trials. Planted in 2008.

Echinacea ‘Mistral’ – 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’ – 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’ – 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.